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The Dyeing of Silk (Organzine and Tram) "Fast to Sun and Rain"

Weighting and Dyeing—What Fastness Required?—A Table of Fastness Properties—Light and Water Fastness Standards—Significance of the Tests

By RAYMOND CURTIS

Bradford Dyeing Association, U. S. A.

FINE silk for weaving into ribbons, braids, banners, etc., is frequently required to be dyed with very good fastness to light and water—or, in the frequently used and more descriptive term, "fast to sun and rain." It is customary in the trade to have these silks dyed "14-ounce"; that is, with about 2-ounce weighting to the pound. For this weighting tin is out of the question, because it would not only increase the difficulty of dyeing fast colors but would render the silk much more susceptible to tendering in sunlight. Sugar weighting for silk which has to withstand wetting is very unsatisfactory, so that there is really only weighting with tannin which is available. Indeed, it is doubtful whether this tannin should be regarded in the nature of a "weighting," for initially it would certainly be used to get the necessary water fastness; while even to-day, with faster colors available, the presence of this "weighting" is a very material help in getting the best possible fastness.

In most dyehouses the kind of tannin used for weighting depends on the shade—ordinary sumac extract for heavy shades, colorless for medium shades, and pure tannic acid for the light shades—and the weighting is generally carried out previous to dyeing. The boiled-off silk is entered in the boiling bath containing the necessary concentration of tannin and turned occasionally during four to six hours in the cooling bath. Subsequent dyeing will lower the weighting somewhat, but this is easily allowed for and there is no difficulty in getting the silk full "14-ounce." Some dyers prefer to do the weighting along with the actual dyeing operation. After five turns through the dye liquor (made up with the usual amount of boil-off) the tannin solution is added, together with the necessary dye addition, and the dyeing is continued until on shade. The amount of weighting is much more uncertain than in the former method, and the cost for tannin works out appreciably heavier; but this method does obviate the danger of staining the silk too heavily with sumac to get the required shade, while with many dyestuffs the dyeings are appreciably faster to water.

In choosing dyestuffs for this class of work the dyer, in addition to considering the fastness properties of dyes, has to realize that the standard of matching is very high, that the silk must have the highest possible luster, and that after a lengthy dyeing operation it may be impossible to wind the silk. These considerations shut out the use of vat sulphurs and developed colors, and the choice is therefore limited to direct and acid dyestuffs. In considering the rival claims of these two classes it should be borne in mind that if the full 14-ounce weighting is essential, it is very desirable to dye in an acid bath; and while most of the direct dyestuffs can be dyed from a boil-off bath broken with acetic acid, more level results are obtained in a neutral or soap bath. Also, since the dyeings when wet must not stain white cotton, there is possibly less danger in using acid colors than with the cotton colors, unless the latter are very carefully selected. Hence, most dyers will give preference to dyestuffs of the acid class, and only where this class is particularly weak, as in the browns, will they resort to the direct class.

What Fastness Is Expected?

Other considerations besides fastness which influence the dyer in his choice of dyestuffs will be their dyeing properties, their price, and his familiarity with the colors in other directions. If a particular dyestuff

is giving satisfaction in the dyehouse it is far preferable to extend its use in other directions rather than introduce a new dyestuff which has no very marked superiority.

There arises, of course, the question as to what fastness a manufacturer expects when he specifies a certain shade to be dyed fast to "sun and rain." With regard to the latter there can be no room for doubt; in the test (described below) there must be practically no staining of the white. This is absolutely essential; and where dyes of the necessary light fastness fail to satisfy this test they must be replaced by others of inferior light fastness, even, if need be, of the basic colors. But as regards light fastness, no hard-and-fast line can be drawn, and the dyer, if he is wise, will always give the best available light fastness consistent with the limitations already referred to. If the light fastness can be classified as very good (5 or better in the German fastness classification), there is very little likelihood of any complaints; but with a poorer light fastness than this there will always be complaints. It is a good plan for the dyer, when dyeing a new shade which cannot be classified as very good, to inform the manufacturer as to the best possible light fastness and to put the onus on him as to whether the goods are dyed with this inferior fastness or the shade suitably modified.

While an approximate idea of the fastness properties of dyestuffs can generally be deduced from the dye manufacturer's pattern cards, a better selection will generally be made if the more likely colors are tested simultaneously on tannin-weighted silk and the results carefully analyzed. Each dyer, of course, will have his own list of dyes which he considers "likely colors," and no special claims are made for the accompanying list; it includes those dyestuffs which the writer was using at the time on this class of work, along with others that had from time to time been recommended.

Most of the dyestuffs were dyed in light,* medium and heavy shades, either in boil-off broken with acetic acid (dyeing method 1) or boil-off broken with sulphuric acid (dyeing method 2), and tannic acid sufficient to give about 2-ounce weighting was added to the dye bath fifteen minutes after the addition of dye, temperature 195° to 200°, and the dyeing continued for a further forty-five minutes at this temperature.

Light Fastness

The tests for light fastness were carried out as recommended by the British Silk Research Association in its report, "The Fastness of Dyes on Silk," except that the exposures were made for seventy days instead of three months. The dyeings, along with the standards, were exposed under glass to a south light in England. One part was exposed seventy days (July 24 to October 2), one part for thirty days (September 2 to October 2), and part was unexposed.

The British Silk Research Association standards are:

	Grade
20% Caledon Red BN Paste (Col. Index 1162)..	1
2% Chlorazol Fast Red FG (Col. Index 419)..	2
2% Chlorazol Violet N.... (Col. Index 394)..	3
2% Ponceau RG ..... (Col. Index 79)..	4
1% Methyl Violet 2B..... (Col. Index 680)..	5

[All these colors have American prototypes; see 1928 Year Book, A. A. T. C. C.]

However, in recording the results of the exposure and comparison with standards it has been thought advisable to change the classification of the British Silk Research Association (which, in view of American and European practice generally, has nothing to recommend it) into Excellent (Ex), Very Good (VG), Good (G), Fair (F), Poor (P), corresponding to their grades 1 to 5. In the dyeings classified as "Excellent" the percentage loss of color in the standard and the dyeings after seventy days' exposure was so small as to be hardly noticeable. In the "Very Good" class there was no perceptible fading after thirty days, but a slight fading was evident with seventy days' exposure. In the "Good" class the loss of color was quite perceptible after thirty days and well marked after seventy days. In the "Fair" class thirty days' exposure brought about a marked fading and the color was almost destroyed after seventy days, while in the "Poor" class the color was almost destroyed after thirty days' exposure.

Water Fastness

The test for water fastness was carried out as follows: 0.25 gram of dyed yarn (about 6 inches in length) was plaited with a similar quantity of white spun silk and white mercerized cotton. The resultant plait, tied at each end, was immersed in 50 c.c. of clean, cold rain water and stood overnight (18 to 20 hours). The plait was taken out, excess water shaken off, and then dried on filter paper at room temperature. When dry it was unplaited and examined for loss of color and for staining of the white. Although the standards recommended by the British Silk Research Association were used for a comparison, it has been thought better to grade from excellent to poor (as in the case of light fastness), instead of using the rather cumbersome system of grading which that association recommends. Excellent (Ex) signifies no loss of color or no staining, while poor (P) signifies much loss of color or very badly stained. In the case of staining, where there is any difference between the silk and the cotton the lower classification is given.

(*Continued on page* 198)

*Except where otherwise indicated in the table (see page 199), "light" refers to 0.5% dyeing, "medium" to 2%, "heavy" to 4%.

Proceedings of the American Association of Textile Chemists and Colorists

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QUARTERLY MEETING OF THE PIEDMONT SECTION

THE regular quarterly meeting of the Piedmont Section was held in the Hylmore Dining Room, Jefferson-Standard Life Building, Greensboro, N. C., on Saturday evening, January 19. Dinner was served at 6.30 and the meeting convened immediately afterward.

The program that had been announced drew one of the largest attendances on record, and at the conclusion of the evening the members were agreed generally that this was the best meeting ever held by the Section. There were almost 200 present, and every question presented was discussed freely by both members and their friends.

The meeting was called to order with Prof. Charles E. Mullin, of Clemson College, South Carolina, presiding, and T. J. Nuckolls, of Greenville, S. C., acting as secretary.

It was moved, seconded and carried that at future meetings each person attending shall pay one dollar in addition to the amount charged for the dinner plate, but that this charge is not compulsory, and need not be paid if objected to.

Prof. Mullin—I would like to ask if there is any particular subjects you would care to have discussed at future meetings. It is much easier for the program to be arranged if we have some idea of what you would like to hear.

Member—There is a good deal of interest in shrinkage, shrink proofing of cotton fabrics. I cannot suggest a speaker on the subject. Perhaps that could be better handled as a symposium, rather than have one speaker to discuss it.

Prof. Mullin—We are so fortunate as to have with us Mr. W. W. Bray, Director of Textile Research for the Procter & Gamble Company. I know you have all read his papers, many of them sent out as bulletins by his company. He has also published some papers in the REPORTER and other journals. Mr. Bray has received his degree from the Massachusetts Institute of Technology, and is well qualified to speak upon the subject he is to discuss, as he has studied it for a number of years.

Proceedings of the American Association of Textile Chemists and Colorists

Soap Applications and Textile Processes

By W. W. Bray,
Procter & Gamble Company

SINCE the use of soap in textile processes is very widespread, I shall limit myself to-night to a few typical examples, to point out, first, how soap works in these particular processes, and what type of soap is the best for this work.

A.—Boiling-Out Cotton

In boiling-out raw cotton, there are a large number of impurities that must be dealt with, which fall into two classes in relation to their necessity for the use of soap. The first class, including pectin compounds, albumins and mineral matter and certain sizes, are removable by the use of water, alkalized, or special agents such as enzymes, for certain types of sizing materials. In the second class fall cotton wax, fatty matter, coloring matter and, to a certain extent, sizes.

The removal of these is greatly aided by the application of soap to the boiling-out process. The cotton wax must be emulsified in order to remove it from the cotton fiber, and in this emulsification alkali alone is at considerable disadvantage. While a wax of this type can be emulsified to a certain extent, by straight alkalies, the emulsion is not at all permanent, and complete removal of the wax is thus very difficult. The addition of the correct amount of soap, however, greatly assists in the formation of the emulsion, and makes it sufficiently stable so that the wax can be almost completely removed during the specified washing processes. The fatty matter encountered on cotton is saponifiable by caustic soda only. The milder alkalies, such as soda ash and silicate, are not sufficiently strong to effect this saponification, and here we find a distinct value in caustic soda for kier boiling, as compared with the other alkalies.

Since a small amount of soap will almost always be formed by this combination of the caustic soda with the fatty impurities on cotton, care must be taken that trouble does not arise with lime soap. This small amount of soap will probably not be sufficient to counteract the lime salts in the water, unless the water used has been specially softened by zeolite processes. Therefore, unless sufficient soap is present to overcome this hardness, and to carry the lime soap thus formed in emulsion, there is great likelihood that the lime soap will coagulate into curd, making a deposit on the cotton, which is very difficult to get rid of.

It is interesting to note the probability of an analogy between the effect of soap on the coloring matter in the cotton fiber, and that which soap has on either natural or added color in boiling-off raw silk. In the latter case, we know that soap is far more effective in boiling out natural color or added tints, than is alkali alone, probably on account of the emulsifying action of the soap towards tiny particles of dyestuff. While we have little positive evidence to prove this point, it seems highly probable that by the use of soap considerable coloring matter can be removed in the kier. The advantages of soap, then, in kier boiling, are, first, an easier and more complete removal of natural oil and waxes, and a better color.

In addition, it is doubtless true that the addition of soap to the kier liquor hastens wetting-out and tends toward more even circulation. Although tallow soap has been considered more or less a standard for such high temperature operations, the choice of a soap for this purpose is very much complicated by other factors which totally destroy any economy that such a high titer soap may have under these conditions. We find that a low titer or sodium oleate type of soap has very distinct advantages, among which are the great convenience of use furnished by its high solubility, its consequent greater ease of rinsing, and particularly by its resistance to the formation of sticky curds when attacked by the hardness in the water.

It is well known that lime soap formed from high titer fats such as tallow, gathers very quickly into a rather hard and sticky mass which readily adheres to the fibers. When the titer of the soap is as low as it is in sodium oleate, the lime soap formed is not so hard and does not have so great tendencies to curd out, but is quite easily maintained in a finally disbursed form, so that lime soap specks are largely eliminated.

B.—Rayon Scouring

The use of soap for rayon scouring has been rapidly increasing in late years and becoming a part of textile processes in many plants formerly devoted exclusively to other textile fibers. The purpose of the scouring, of course, is the removal of knitting and spinning oils, with also some sizing materials, chiefly in the case of rayon piece goods. On the latter occasion, enzymes are frequently used to remove more efficiently starch compounds. For the oil, however, a combination of soap and alkali in correct proportions is the most efficient scouring agent in the great majority of cases.

The alkali, of which sodium carbonate is a typical example, has a distinct function to perform. The use of such an alkali with soap greatly increases the detergent or cleaning power of the latter. Care is needed, however, that excessive amounts of alkali are not used, since all rayons, to a greater or less extent, depending on the type, are sensitive to the action of alkalies. The proportion, therefore, must be carefully regulated with

respect to the temperature. If this is high, the proportion of alkali should be reduced. If low, the relative amount of alkali can be increased to advantage.

Again, we find a number of decided advantages for the oleate type of soap as compared with those of higher titer. It has greater solubility, for example, requires much less time to put it in solution, which is a particularly important point, because frequently rather low temperatures are employed. Correspondingly, the rinsing is made much easier by this higher solubility, and thus time and water consumption are reduced. Again, the resistance of the low titer lime soap to clotting or curding is distinctly helpful. Moreover, the softness of this kind of soap is oftentimes taken advantage of, particularly in a one-bath scouring and dyeing process, to impart a soft handle or finish to the dyed rayon goods. In this connection, it is important that the soap be free from odor and from any tendency to go rancid.

While the objection has been raised to a low titer soap, that, on account of its high iodine value it has a greater tendency to rancidify than a soap-like tallow, for example, which has an iodine value about half as high, nevertheless it is possible to make a commercial sodium oleate which is absolutely safe in this regard. Careful tests have proved to us that the tendency of a soap to go rancid is affected more largely by the purity of the stocks used, and by certain treatments which are possible in manufacture, than by the iodine values of these stocks. Thus, a low-grade tallow soap will become very rancid long before a high-grade oleate will show any such tendencies.

In regard to the mechanism of scouring, several theories have been advanced to explain what takes place, but the one which seems simplest and most reasonable may be briefly described as follows: The first step is to wet out the oil film which surrounds every fiber in the material to be scoured. In this step, the reduction of surface tension of the scouring liquor, caused by the soap and alkali, is their chief value. Once this film is thoroughly wetted, it must be broken up so that the oil can be removed. Agitation of some sort is necessary at this point to loosen the oil and enable soap and alkali to exercise their emulsifying powers.

Emulsification is brought about by breaking up the oil in the bath into very tiny particles, each one of which is then surrounded by a very thin film of soap, which tends to maintain the oil in this fine state of subdivision, and prevent the tiny droplets from gathering together again into an oil film. The permanence of the emulsion is also of great importance, since this oil must be held in the emulsified state until the liquor is run off or the goods removed from the bath. In order to assure permanence of this emulsion, the safest guide is to add sufficient soap to maintain a lively suds at all times on the scouring bath. The presence of a suds of this sort indicates that there is sufficient soap present to take care of all the oil, leaving a very small amount as a factor of safety against precipitation of oil on the fibers being scoured.

C.—Silk Hosiery Degumming

The purpose of this operation is to remove from the silk fibers the natural gum with which they are coated, as well as greater or less amounts of oil which have been added to assist in knitting. In removing the silk gum, the soap acts in a way which is entirely different from any other application of soap with which we are familiar. The silk gum is removed by actual chemical combination with the alkaline portion of the soap, which attacks sensitive gum and renders it soluble so that it can be completely removed by rinsing. The reason why soap is able to do this is that soap, when dissolved in water, reacts to a very slight extent with the water, forming a minute concentration of sodium hydroxide or caustic soda. This small quantity of alkali attacks the silk gum, more alkali is released by the soap, and the reaction continues until the gum is entirely removed.

At this point the operation must be stopped, because the silk fiber itself is sensitive, if less so than the gum, to the action of the alkali liberated by the soap, and on continued boiling in the soap solution will be harshened, yellowed and ultimately weakened to a considerable extent.

It is evident from the foregoing that the soap for this purpose must be very carefully selected. It is in this field that the low titre soap really shows to its greatest advantage. Its ready solubility is of particular importance, in view of the convenience of making up a concentrated stock solution which will remain liquid at room temperature, and from which additions may be made to the boiling off by liquid measurement. Then, we find that the concentration of alkali formed by the reaction with water, termed "hydrolipis," is distinctly lower than that formed by soaps of higher titer. Even in comparison with the olive soap, which has long been standard for use on silk, the lower titre brings about a decided improvement. The lower concentration of alkali means that a more efficient degumming is brought about, because less alkali is wasted or dissipated by reaction with the silk fiber itself, and thus the latter is kept softer and more lustrous than by any other means. Rinsibility, of course, is highly important, because it is usually advisable to remove as much soap as possible from the boiling-off stockings.

Alkali can sometimes be used to advantage in a hosiery boiling off, but great care must be exercised at all points. The alkali should be used only as assistant in

scouring off the knitting oils, and should not be depended upon to do the actual degumming, because of the very great likelihood of injuring the delicate fiber.

A convenient process for carrying out a hosiery degumming consists in giving a preliminary scouring with relatively small quantities of soap and alkali at a temperature of 160° to 180° F. After running in this liquor for a few minutes, the bath should be changed and a fresh liquor should be brought on, containing sufficient soap to carry out the degumming itself. By this means, the majority of the oil is removed at the beginning. A much cleaner stocking is made possible, and the danger of oil spots is greatly lessened.

D.—General Superiority of the Oleate Type of Soap

We have examined the function of soap in three typical textile processes, wherein the work is of widely different nature. In the first, boiling-out cotton, the process involves the removal of a small amount of impurity, which is very difficult to loosen and thoroughly emulsify. Rayon scouring, similarly, is a true detergent problem, but differs in that we are dealing with a large amount of material which is relatively easy to emulsify and wash off. On silk, the soap performs a combination of detergency with a true chemical reaction.

In each of these processes we have seen that the sodium oleate soap functions with as great or even greater efficiency than any other type, as far as the main function of the process is concerned, while in many incidental respects it possesses great advantages which make its use highly profitable. In solubility, effective emulsifying power, mild action during degumming and more complete rinsing, this low titre soap carries numerous advantages wherever the best results are desired.

Discussion of Soap Applications in Textile Processing

Clyde Brooks—I would like to ask which lowers the surface tension the most, low titer or high titer.

Mr. Bray—That I cannot answer definitely. In the first place, surface tension measurement is subject to great discussion and great variety of determination, and very few people will agree on the results given by different methods, but I have never seen any surface tension measurements made comparing low and high titer soaps that I thought could be depended upon. I would say offhand there would be little practical difference. The surface tension lowering of soap is dependent to a considerable extent on temperature and other factors which affect the surface tension more than the difference between the soaps.

Thomas Johnson—What soap is recommended for dissolving SRA dyes, that is going into the dye bath with SRA dyes where rayon and Celanese would be present.

Mr. Bray—That function of soap depends on a suspension of the dye particles more or less in paste form. I would favor a low titer type for reasons of later rinsibility, and the fact also that a more concentrated solution of soap can be held in liquid form without tending to jell.

Mr. Souther—I would like to ask Mr. Bray if he has any criticism to offer on the measurement of the efficiency of soap. I have in mind an article which appeared lately in which a report was made from actual test of the efficiency of soap. The reference Mr. Brooks made to the surface tension measurement brings to my mind the method of measuring the efficiency.

Mr. Bray—We have made attempts to measure the effect of soap by every method we could think of, such as measurements of surface tension, surface viscosity, foam power and permanence, etc. So far as we have been able to determine, the washing power of soap is not necessarily dependent upon any of them, and therefore as a method of measuring the cleaning power we get down to an actual washing test on some kind of standard dirty fabric. In the textile laboratory we have been experimenting with scouring wool skeins oiled with a definite oil and have obtained fairly satisfactory results.

In the textile industry the object is more to take off oils than solid dirt. For the latter determination we soil a piece of cotton sheeting with a mixture of known types of dirt, held on by suitable binders, which is really dyeing the cloth with dirt that is very resistant to washing off. It is a similar sort of thing to the standard dirty towel that has been used by the A. A. T. C. C. committee that developed the standard wash test. They used a striped towel, alternate black and white. We use a solid colored towel and measured the dirt removed by any soap, by means of a specially developed colorimeter which gives very nice results in measuring the amount of dirt removed. In textile work we feel that oil emulsification is a larger factor and we have been working along that line.

Wash Tests on Sheeting

Dr. Chase—I would like to ask Mr. Bray if they have made any actual tests as to the amount of foreign matter left in the cotton sheeting, for instance, after having been boiled in a kier with caustic soda or with caustic soda and soap. Have you ever tested whether in boiling sheeting it is an actual improvement to use soap in the boiling out?

Mr. Bray—We have not personally made those tests. We have depended so far on fairly reliable records of tests of that kind which indicate that the amount of

wax and impurities removed by the use of soap with alkali is greater than that removed without the use of soap.

Also, in the line of the color proposition I speak about, there were statements to the effect that a whiter boil-out is obtained by that process.

Our laboratory research work in the textile field is relatively new. We have had the laboratory going for about two years, and for various reasons our first work was done on silk and wool. We turned our attention to cotton just recently and have, you might say, just completed a survey of the possibilities there, and have not gone into great length in actual cotton research. We are planning to go as far as our time and opportunities will permit along that line, and one of my colleagues in the laboratory is at present visiting a number of mills in this section to discuss soap problems as a basis for doing more extensive practical research in that field.

Mr. Smith—I would like to ask Mr. Bray if there is any work done in connecting up the relation between the wetting-out and cleaning properties of soap.

Mr. Bray—That goes back to the question asked a moment ago about the comparison between the reduction of surface tension and the scouring efficiency of the soap. Your wetting-out power is very definitely related to reduction of surface tension, while your scouring ability depends partly on that, but there are more factors entering into it. There is a decided connection between reduction of surface tension and wetting-out power, but very little if any connection between scouring ability and wetting-out power.

Mr. Walker—I would like to ask if there is any foundation for the general belief that a potash soap is better for textile use than a soda soap.

Mr. Bray—We found absolutely none. We went into that at great length in connection with wool scouring, and we have not been able to justify any of the claims made for potash soap. We went into this problem for quite disinterested reasons and after extensive experiments we found no basis for preferring potash soap. Low titer soaps in general are preferred for wool, and we could find no superiority for the potash article.

There is one question I would like to put. I have heard various references to boil-out processes which did not reduce the weight of the cotton fabric as being advantageous. I take that to mean that these boiling-out processes do not remove fully the wax and fats and what not.

I would like to know how that affects the cotton processing in later stages, whether the cotton with the wax on can be handled in regard to bleaching and dyeing as satisfactorily as that which is thoroughly boiled out or one from which all fats are removed, and just what the advantage is, other than the superficial gain in weight which comes from leaving those materials in the cotton.

Mr. Haddock—If the wax is taken out of the fabric entirely the dyestuff will be dyed on the cellulose. If the wax is left the dyestuff will be left on the wax and cellulose. I think the removing of the wax prior to dyeing and wetting does not mean anything if the goods are bleached.

Mr. Bray—What I was referring to specifically was a description of bleaching cotton in the kier with peroxide; it was said such a process could be carried out, producing a good white and not removing so much weight as would be done by a regular, thorough boil out. Is that extra weight merely desirable as extra weight, or does that wax, remaining there, have other beneficial properties?

Mr. Ekerstrom—Was it low pressure or high pressure?

Mr. Bray—The kier was open to the atmosphere. This was low pressure I especially refer to.

Mr. Ekerstrom—Low pressure is not used any more in bleaching. The modern kier is all high pressure, and the goods going through the kier at high pressure are supposed to have all natural matters removed.

Mr. Bray—This particular process was peroxide bleaching. The kier was open to the air, no pressure at all, you might say.

Mr. Ekerstrom—The peroxide, I expect, was an entirely different process from what I had in mind.

Member—I think I can answer Mr. Bray's question in this way: As far back as fourteen or fifteen years ago, and as far as I know the idea still prevails that goods in the natural state have a more marketable value than goods that are thoroughly de-waxed and then resized. Personally, my experience has been very disappointing when trying to retain that natural feel and then redyeing the goods. It is almost impossible to get uniform dyeing. What success they have had with the peroxide bleach I am not familiar with.

Clarence Cone—I do not know whether I can answer Mr. Bray's question. I have done a good deal of bleaching on raw stock cotton to be redyed. I have never made any test about the loss or gain in weight, but it has been my experience that there is a loss in weight. The cotton that is redyed is heavier than the cotton that goes through its natural process in the natural way, but in our plant we have always put a good deal of softening oil in the last process to give it the qualities it ought to have. We never use any soap with the caustic or soda ash. Sometimes we use one and sometimes the other according to the grade of cotton we use. If we use good middling or strict middling we use soda ash, but with the lower grades we use a good deal of caustic soda, and with that cotton we have to use a good deal of softening in the last process.

Mr. Ekerstrom—Do you do that to bring back your natural fatty matters?

Mr. Cone—Yes.

Mr. Bray—I have just one more comment to make in regard to soaping raw cotton. A couple of years ago we had in our laundry department a problem of scouring cotton made up for use as children's nightwear, on which it was desirable to retain all possible of the natural wax and yet get rid of the slight impurities that had been accumulated during the processes. In other words, these goods were to be as non-absorbent as possible. We misunderstood that at the beginning and gave them a good wash, not as severe as a caustic soda boiled out, however.

I washed these goods in about 5% of the weight of the goods of Ivory soap and half as much soda for thirty minutes. The result was a cotton which to the feel at least had very little of the natural waxes left. I am sorry I did not make quantitative determination of the amount of wax left, but offhand I would say it was largely removed. That was done at a temperature of 160 degrees.

Mr. Ekerstrom—By boiling out in soap you relieved the fabric entirely of all matter, didn't you?

Mr. Bray—Not entirely, but practically.

Member—I do not think there can possibly be any question but what there is a loss of weight in scouring. The heat itself will dissolve some of the impurities and they will be washed off. The water will do more, and when you combine heat and water with alkali you remove still more. Different cottons will show different losses in weight, due to the fact that cotton from different sections contains different mineral impurities, so I do not see how it is possible to retain the natural weight and get good bleaching or dyeing; but if you want to regain that weight you can do it with far more pure compounds than can be found in the cotton.

Mr. Bray—That was the thought occurred to me, but according to the statement made in the paper I referred to, peroxide bleach can be done with less loss in weight.

Mr. Potter—Cotton goods can be bleached in a kier without completely removing all the natural waxes. This bleached material can be direct dyed or vat dyed or even printed.

Thomas A. Marlow—I would like to answer the question asked. The saving of that weight of 6 to 9% is very important on certain types, particularly yarns, where they are brought in and shipped out on weight basis. I would like to ask Mr. Potter if it is a successful procedure, what effect does it have on absorption of the yarn?

Mr. Potter—No claim has been made for the peroxide bleached material being absorbent, but this can be done with certain extra treatment. You do not get absorption to any extent, but it does answer the purpose for direct dyeing or vat dyeing or printing. Why, I cannot say.

Mr. Thompson—Mr. Potter is right and I believe the others are right, but if we are getting an absolute standard I think there is no doubt but what the impurity must be removed. I know Mr. Potter is right, but for all things that is not practical.

Dr. Mullin—It is not necessary for me to introduce Mr. Marlowe. He has many questions which have been asked and we will now have the answers.

Rayon Scouring

Mr. Marlowe—I was particularly glad that Mr. Bray eliminated certain points in his talk to-night, as it relieves me of certain of my questions. We have had quite a few of them, particularly on bleaching and things of that kind, but the question of rayon scouring and hosiery degumming has not been mentioned. A question has just been passed to me with reference to rayon scouring, referring to rayon mixed hose wherein there have been rayon winding oils used, natural oils and other impurities. The question is: Is it necessary to maintain suds throughout the scouring operation?

Mr. Bray—That, I think, depends on how the operation is conducted. If the silk is to be boiled out and the rayon scoured in one soap liquor I would say that suds would be a desirable thing, for the reason that you know there is enough soap to take care of the gum on the silk. In boiling-off silk the soap liquor that we use for removing the gum really becomes inefficient for boiling-off long before its sudsing powers are exhausted. In boiling-off silk piece goods, the original soap liquor ceases to boil off when the soap is about half used, or at least it is impractical to proceed further with the boiling off on account of the slowing down in the rate of degumming. But if an operation like that is conducted in two parts, such as the outline I gave, having a preliminary scouring bath followed by a true degumming bath, the suds would not be necessary, in fact, would probably not be produced. You would use soap and alkali to get off the major portion of the oil from both the rayon and the silk and then proceed to degum the silk in an amount of soap which would be in excess of that required to remove oil from either the rayon or silk.

Mr. Marlowe—I take it the gentleman had particular reference to scouring of rayon. In connection with Mr. Bray's talk on the degumming of silk, his indorsement of the low titer to replace the higher or olive oil soap as being more effective, I would like to ask if he attributes the actual degumming to the emulsification plus hydrolysis, if he has less hydrolysis in the higher titer oil than in the lower, and if he would not have a more

accurate measurement of strength of his degumming bath if he used the olive oil with silicate of soda of milder form.

Mr. Bray—I think there are three questions in there. The first is as to whether that reaction is a combination of detergency and chemical reaction with the gum. Of course, you have to scour off any oils there, and there are generally various kinds of oil on silk hosiery. To that extent detergency is involved. To get off the gum a chemical action is involved. Alkali liberated by the soap combines chemically with the silk gum. Just how that gum is dispersed is something we are not sure of. It doubtless has considerable colloidal properties. I do not believe soap is necessary to hold that removed gum in emulsion, but there is another factor wherein the emulsive properties of the soap are required. As the alkaline part of the soap is used, fatty particles are liberated that must be held in emulsion by the soap. There is also the probability that a certain amount of emulsifying or suspensive action enters into removing and holding the color from the silk gum.

As to the second part of that question, I believe I said that the lower titer soap hydrolyzes less than the high titer. For the strictly high titer, we have tallow, with a titer of 42°. Then olive oil really falls in the class of low titer, but not as low as can be obtained and as low as will give the best results. Olive oil is around 22°. For the really low titer we allow a range of from 10 to 12°. Thus there is a difference of 20° between tallow and olive oil, and 10° between olive oil and a true low-titer oil, so that the differences in properties between the last two will be about half the difference between a tallow and an olive soap.

Will you repeat the third question?

Mr. Marlowe—Would you not have a more accurate or more uniform or more controllable degumming bath through the use of silicate of soda with your olive oil?

Mr. Bray—I do not think so, for this reason: With olive oil or lower titer soap or any soap put out in a standard form—I mean in uniform condition, one lot being the same as another—you have material which has a definite alkalinity or which produces a certain pH value. If we add silicate to that we are bringing in one more factor which we have to control. In the first place we have to settle the question of the alkalinity of the silicate, and this varies widely. Then we have to control the amount of silicate added. Then again, we are making in most cases a higher alkalinity, and it has been our experience that the lowest alkalinity we can get and be effective in boiling off gives the best results. We have tried to make combinations of soap with silicate and with other combinations of alkalies such as carbonate, etc., that would give a degumming medium cheaper than soap and presumably of the same alkalinity. We could cover quite a range of substitution of soap with various alkalies in what we consider a buffed condition so that the pH value of the whole was presumably the same as neutral soap, yet we found as we increased the amount of alkali present we increased the degree to which the silk fiber itself was attacked. We made measurements of that by artificially producing chafing on a friction machine.

Mr. Marlowe—Therefore, even though the low titer soap is closely akin to the olive oil, the hydrolysis is greater in the olive oil.

I would like to ask this question—that being the case, aren't the natural softening and lubricating properties of olive oil maintained to a larger degree? That is of major importance in handling silk.

Mr. Bray—I do not get the meaning of the question.

Mr. Marlowe—You have a liberation of caustic soda in greater degree than in low titer. If you use silicate for the detergent action, or use it alone provided you use enough of the olive oil to perfect the degumming, would you have more of the natural or higher value of the oil or softening given to it?

Degumming Power of Silicate

Mr. Bray—If you use silicate you can reduce the soap to a corresponding degree. A given amount of silicate has much more degumming power than the same weight of soap; also, the silicate is more highly alkaline than the soap. Therefore, it is reasonable to assume that the silicate will be the first effective degumming agent. The soap will be called upon to degum what the silicate does not finish, and to effect a general buffing of the alkalinity of the whole. As far as the lubrication is concerned it has not been our experience that the soap used for degumming is responsible to any extent for lubrication of the silk fabric in the finished state of the goods. After degumming you must rinse, primarily in order to get out the dissolved gum, and secondly, soap or other fatty material which may interfere later, particularly if the hose are acidified before removal from the machine. Therefore it is our belief that silk hose after degumming should be rinsed quite thoroughly to get the best results, and when you do that you largely remove the soap. As far as the lubricating qualities of the soaps in themselves are concerned, it has been our experience that the lower you go in titer the softer feel you get from the presence of this soap. You can see that most obviously by a comparison of the soaps themselves in their manufactured form.

We make an olive flake and also a lower titer flake, and by taking a flake of either you will notice the olive flake is very brittle, whereas in the lower titer flake you find quite a bit of resiliency and more velvety feel.

That is an illustration of what we believe actually happens if and when those soaps are left on the goods. With lower titer soap we have a number of indications that you get a lubrication of silk or other textile fabric which approaches in great degree that obtained with sulphonated castor oil.

Mr. Thompson—You may recall an article published by Professor Scott in which he started off with a bath of certain alkalinity. The pH at the end of the bath was tested and they found the alkalinity had dropped. He also found it possible to increase the alkalinity to the original point by addition of caustic soda, and he could therefore degum by keeping a standing bath and bringing it back to the original alkalinity. If it is done carefully, Dr. Scott claims, it is a practical proposition.

Mr. Marlowe—That brings us back to Mr. Souther's question awhile ago. If you have lost your alkalinity you have more free oil or more fatty acid to rinse from the silk. I should think the surface tension question is dependent largely upon the solubility, for with solubility comes greater emulsifying value, greater penetrating value and easier rinsibility.

There are a number of hosiery mill men here, and we have not heard from the hosiery dyers. I would like some of them to say something with reference to the effect of easier or more difficult rinsing of their hose, whether they find many rinses necessary or whether fewer rinses are better.

Mr. Geddy—I would say in connection with degumming hosiery, the problem is not the softening of the silk, it is to keep it soft, and my experience is, the less alkalinity you use the softer the silk will be.

Number of Rinses

Mr. Marlowe—Will someone give an expression as to the number of rinses they find to give the best feel.

Mr. Bray—I want to offer one point in that regard. The number of rinses will depend on many things, of course, among others upon the relation of the load in the machine to the rated capacity of that machine. To make the latter point clear, the machines have a certain rated load. Our laundry department has a great many records and tests conducted in rinsing clothes in similar machines used in the laundries. They have conducted tests and have records in such machines with various loads, and they find that when the load is greater than the carefully determined rated capacity, the difficulty of rinsing is increased out of all proportion to the increase in size of the load. We proved, for example, that a man may increase his load 20% over rating and actually cut down the capacity of the machine over a period of several washes because it took him longer to perform any given operation on that machine.

Mr. Marlowe—One more question. You spoke of lime proofness of a soap, and if you do have lime scum, by adding additional soap you eliminate that. Has that been the experience of most of you, or can you give an explanation of it?

Mr. Bray—With every soap almost the entire danger from lime soap deposits comes during rinsing. In a scouring bath, of course, the lime soap is formed, but we have soap there in excess. If our bath is correctly made up, enough soap to emulsify the oil and emulsify the lime soap formed will be present if we have a suds. When that bath is drawn off or the goods are taken from it they are protected thereby from deposits of lime soap. When we start to rinse, the real trouble begins because the hard water hitting the residual soap reacts with that soap and forms the lime deposits.

Perhaps on the first bath you have enough soap to form some protection, but eventually you will reach a point where the soap is so reduced that the lime salts kills all that remains. There you will have possibly a uniform distribution of the lime soap deposits, or, if the agitation breaks the lime soap loose, you will have at least a tendency towards coagulation of these soaps into curds which will settle upon any available surface.

Mr. Marlowe—We cannot spend too much time on this. Mr. Bray has given us a very interesting paper, and the discussion has been interesting. Mr. Bray stuck strictly to soaps and the discussion was on that subject. I thank you.

Dr. Mullin—If we could have that much discussion on every paper, we would need only one an evening. I am certainly delighted.

We plan to designate someone to lead the discussion on every paper. If anyone wishes to ask a question, and prefers not to ask it in person, mail your question to the man leading the discussion, or hand it in to him.

The next speaker on the program is Prof. A. H. Grimshaw of North Carolina State College. You have all read his papers. One of the best papers I ever heard was delivered by him right in this room. We are always glad to hear Professor Grimshaw.

Starches Used in the Textile Industry

By Albert H. Grimshaw

Associate Professor of Textile Chemistry and Dyeing, North Carolina State College Textile School

CHAIRMAN MULLIN certainly gave me a large subject when he asked me to speak to you all about starches. Good books have been written on this subject, and I would like at this time to say a word in praise of Robert P. Walton's book called "A Comprehensive Survey of Starch Chemistry." Any questions arising in your minds in regard to starches can most likely be an-

swered by some of the authorities listed in his bibliography.

During 1928 the Textile School of North Carolina State College ran quite an extensive survey on starches as used in some North Carolina mills. The results of these tests have been printed in the Textile World starting in June, 1928, and continuing for five months. A few reprints are available and you will find two or three at your plate, and possibly you will wish to ask some questions later on after looking at the reprints. If the time is limited, write to us at the college and we will try to answer your inquiries.

In the textile industry starches are used from many sources, such as potatoes, corn, wheat, tapioca, sago, rice, arrowroot, etc.

Just a brief description of the making of potato starch which is used in sizing yarn especially for fine counts. It is obtained by carefully washing potatoes, grinding them to a pulp or slicing; then treating with water in settling vats and sieving, etc. A little more in detail: After the slicing, grating, etc., the potatoes are finely ground while being mixed with water, the diluted pulp is then passed over shaking sieves where the starch is washed out with sprays of water and the starch milk is formed. This starch milk is placed in tanks to settle. It settles in rather compact layers with the best starch nearer bottom, and the lighter impurities near or on the top. By opening up holes placed in a vertical position in the side of the tank, it is possible to remove first the supernatant liquor and then wash down with more water. The upper layers contaning the impurities can also be removed. After considerable washing, the starch is placed in the driers especially made for the work.

During the war we ran some comparative tests on starch from potato made in Germany, in Japan and in Maine, and found the foreign starches to be superior to the Maine starch. This was explained at that time in this way: the Germans and the Japanese used only the best potatoes in making starch, whereas in Maine the best potatoes were used for food and the poor potatoes were made into starch. The first week of January we had some inquiries from a large New England mill in regard to potato starch and advised them if possible to run comparative tests in a practical way. Last week I had a report from them in which they said that the potato starch from Maine gave results which could not be distinguished on the warp from the warp sized with the imported starch. It pleased us to think that possibly the Maine makers of starch are thus improving the quality of their potato starch.

A number of years ago I visited the plant of the Corn Products Refining Company situated on the Hudson River across from New York City, and that trip was so interesting that I went again this past summer to visit it. When I tell you that it was one of the hottest days in summer and that it takes all day to make the trip, you will realize how interesting it must have been to me to go in such hot weather. Dr. W. R. Cathcart and the others in charge were very fine in their attentions to me in this visit and pointed out many things of interest. As it would be impossible for me to give you the report of the various processes from memory, I will take the liberty of quoting almost word for word from the little booklet called "The Story of a Grain of Corn," written by Dr. W. R. Cathcart, of the Corn Products Refining Company.

The part of the grain of corn that interests us is the kernel, which consists of a mixture of starch and gluten. Within the endosperm and near the apex or pointed portion of the kernel is the germ, containing the oil and some fibrous material.

The first objective in the process is to separate these various constituents as completely and economically as possible. First comes steeping: the steeps are large cylindrical structures, usually of wood and cast iron, capable of holding 2,500 bushels of corn. Warm water containing a small amount of sulphur dioxide gas is circulated over the grain until the kernels have become softened. The sulphur dioxide solution serves two purposes, it aids in softening and prevents fermentation of the grain at the temperature used. The steep water after this operation contains most of the solubles present in the corn. This water is concentrated by evaporation and used as an important constituent of cattle feed.

Crushing, Grinding and Reeling

The softened kernels are passed through disintegrators with a considerable amount of water to maintain proper gravity. The whole grain is crushed, but particularly the germs are freed, and due to their lower specific gravity float when the crushed mass is collected in tanks called "germ separators." The germs contain the oil.

The magma remaining after the removal of the germs contains the starch, gluten and fibrous material, cellulose. This mixture is finely ground and passed through various stages of washing and screening (reels) which completely remove the fibrous cellulose material.

Tabling

The elimination of the cellulose leaves the starch and gluten mixed with water in a cream-colored suspension. This liquor is then allowed to flow over long, narrow, comparatively shallow and slightly inclined troughs known as tables. Owing to its higher specific gravity, the starch settles out and collects on the bottom of the

tables and the gluten suspended in the water follows the overflow.

The wet starch on the table is already in a high state of purity, of course, a small amount of gluten and fiber is present. Formerly, it was customary to remove this wet starch by shovels and dry in kilns without further treatment. This product represents the crudest form of starch commercially possible. To-day, for the most part, the starch is flushed off the tables with large quantities of water and filter-pressed, which treatment reduces the solubles, and after drying, gives a purer starch.

The starch obtained from the tables by way of the filter-presses is sufficiently pure for many purposes and carries about 45% moisture. This moisture is removed by drying in kilns, through which a current of hot air circulates at carefully controlled temperatures. If the drying is completed within a few days, the product obtained is a mixture of starch powder and of larger particles usually called "starch crystals." Starch in this form is commonly known in commerce as "pearl starch" and contains 12.5 to 13.5% moisture. To obtain "crystal starch" the wet starch is usually placed in kilns in the form of a compact cube and the drying process prolonged sometimes for weeks. In this way, due to the contraction of the wet mass, irregular lines of cleavage are formed, and finally the mass collapses in the form of what may be described as irregular, distorted prisms, called "crystals."

Powdered starch is prepared from "pearl starch" by a beating and bolting operation which removes hard, overdried particles as well as protein matter left over from the tabling process.

"Lump starch" is obtained by treating powdered starch with steam and subjecting the steamed starch to high pressure. This gives a solid cylindrical mass of starch which is crushed and screened to size.

Last summer this firm was not making much starch at the New York plant, but was making more of the by-products such as corn oil, Mazola, corn syrup, etc.

A little arrowroot starch is used in sizing, but mostly it is used as a food. Some comes from Bermuda and a little from Florida. A number of years ago we examined some made in Florida. It comes from the roots of a tree that grows in swamps, and the Indians bring in the roots, which look somewhat like turnips in shape. At this particular plant a big negro, using a large knife, sliced the roots up into small pieces, and from there on the process was similar to the potato starch process. We found the product from this plant to be much cruder than the product from Bermuda. Arrowroot is also called Maranta.

Sago starch gives a thin paste, used for either light or heavy sizing. The starch is obtained from the pith of certain palm trees. Before the tree flowers, the pith contains considerable starch; but if the tree is allowed to flower, the starch is used up as a food for the flower and fruit.

Uses of the Various Starches

Tapioca starch comes from cassava and is used more in finishing and printing than in sizing. It makes a thin paste. Herbert Kaufmann, of the Stein-Hall Company, acted as a guide for me this past summer in taking me through the Long Island City plant of his company, where they make dextrine from tapioca starch. This company uses enormous quantities, and imports from their own plantations, I believe, which are located in Java. This dextrine plant was an eye-opener to me, and if you have the opportunity while in New York get in touch with Mr. Kaufmann, whom you will find to be a fine fellow and an authority on starch and dextrine. Possibly Ira Griffin could get you through the plant.

Wheat starch is used mostly in printing pastes.

Rice starch is used to make a stiff paste size, but is mostly used in finishing where an extra shiny finish is desired. We can get rice right here in the South.

Quoting Dr. Cathcart once more: "The object in sizing yarn is to increase the strength and weaving quality and, to a minor degree, to add to the weight of the fabric, although in many cases this last factor is not emphasized.

"In general, a sizing mixture should contain three essential ingredients—an agglutinant or adhesive, a lubricant, and a hygroscopic or moisture-absorbing agent.

"In the class of agglutinants are to be included the various kinds and types of starches: corn, potato, wheat, sago, tapioca, and dextrines derived therefrom, as well as certain natural or vegetable gums, such as gum tragacanth, gum tragasol, gum arabic, etc.

"The various types of dextrines derived from the several starches mentioned are almost never used alone for sizing yarn, but frequently in special formulae, together with starch of some kind. The principal reasons for this are that dextrines alone tend to make yarn brittle, and then become sticky in the presence of moisture.

"The vegetable gums for general sizing purposes are never used alone. They have value, but for the most part are too expensive to be used in large quantity."

Walton quotes from a report of the British Cotton Industry Research Association as follows: "Size is applied to cotton warps in order that they may be

woven with a minimum of breakage. When cloth is to be bleached, the size is removed immediately after weaving, but many materials are sold with the size still present, and in these goods the size is frequently employed to modify the weight or physical condition of the cloth. Sizing is roughly classified as "pure" where the minimum quantity required to insure good weaving is applied, as 'medium' or 'heavy' when to 100 parts of cotton warp are added anything from 30 to 200 parts of solid. For the heavier weights the size consists mainly of salts and china clay cemented by just sufficient starch to bind the other ingredients onto the yarn."

Fred G. La Piana made some interesting comments to us one day last summer, in which he spoke of trying to obtain a material which would size the yarn on the outside *only* rather than penetrate, in this way making it easier for the bleacher to remove the size than when it had penetrated and bound the inside fibers together. He said that this material must, of course, be applied in such a way that it would be pliable. I have not heard whether or not he has succeeded in getting just the material that he wished, but believe that he was working with starch and similar compounds. It will certainly be a good thing for the trade if the bleacher's work is made easier.

In sizing, we use most all of the common starches to some extent, but in finishing and printing we usually limit ourselves to such starches as wheat, corn, rice, potato and tapioca, although the others are or can be used in some cases.

Tests of Starches

One of the simplest ways of identifying starches is by use of the microscope, and in the June 16 issue of Textile World we described how this instrument is used for that purpose at the college. Students in our classes who have never used a microscope previously are given some known starches, which they examine under the microscope, and they draw pictures of these starches. They study these pictures and a few weeks later are given some unknown starches to mount on slides and to identify. They can usually identify about 85 per cent correctly, although they have had approximately but a half hour's previous work with the microscope and starches. You all can do the same, and with a little practice it is possible for you to estimate the percentage of different starches in a mixture. Here is our method of mounting starch: A small amount of the sample is rubbed with a glass rod on a watch crystal with a small amount of denatured alcohol or water (we prefer alcohol, as it evaporates quicker). Neither alcohol nor water will dissolve starch. In quick work we breathe on the glass and blow a little of the powdered sample onto it.

Under the microscope, starches show characteristics peculiar to themselves: corn starch appears as circular or polyhedral, with rounded angles; the size is from 7 to 20 microns. (A micron is one-thousandth of a millimeter.) Potato starch has often two different sized granules; when small they are round, but the larger ones are more the shape of an oyster or somewhat like some potatoes; and with higher power you can distinguish a mark in the small end, called a hylum; concentric rings are also shown. Their size varies from 60 to 100 microns, and you can easily distinguish them from corn as just described. Tapioca starch granules are about the same size as corn; the granules as seen under the microscope are usually round, but the distinguishing characteristic is that occasionally one is laying on its side and resembles a kettle drum in shape. There is a dot or slit visible in the center, called the hylum, differing from the hylum in corn, which is usually a star or crack. Diameter of tapioca is from 8 to 22 microns. Wheat starch granules have the peculiarity of having both large and small granules, with the small ones often clinging to the large ones. Both are round in shape, the small ones from 2 to 6 microns in diameter and the large ones from 45 to 52 microns; this difference in size helps to identify wheat starch easily. Rice starch is the smallest of the starch granules usually used in textiles, and the granule has about six sides, from 5 to 8 microns in diameter. These granules do not occur singly, but always in clusters. Sago often appears as an oval granule, but there are always some present which look like urns—that is, as if the end had been cut off the oval. The hylum is a circular spot near one end. Diameter from 25 to 66 microns. Arrowroot granules are from 10 to 70 microns in diameter, hylum near one end. It appears as an oval or muscle shaped granule.

Moisture and Soluble Matter Tests

In making moisture tests, or for that matter in making any tests, the selecting of the sample is very important. It is well known to you that, in sampling coal, great care is taken to secure a sample that will represent all parts of the lot being examined. In our tests made at the college the sampling had not been attended to as it should have been to get accurate results; but we were looking only for comparative results. For a true moisture test you should procure some starch from all parts of the lot being examined, and then mix it thoroughly and quarter it down, as in coal sampling. Starch is hygroscopic, and if exposed to dampness it will pick up moisture.

Several methods of obtaining moisture were recommended to us, and we finally used the following, one reason being that it was more convenient for us to do so: Spread 2 grams of the sample over the bottom of a Petri dish which has previously been weighed along with its cover. Place in the electric oven, with the cover off, and dry at 105° C. for four hours. Replace the cover and place in a desiccator to cool. Weigh. Replace in oven for another short heating, and recheck.

The following notes were received from various firms and authorities on the amount of moisture normally present in starch:* (A) Cornstarch should be below 13%; potato should be below 19%; sago should be below 20%. (B) The moisture in starch varies according to the grade. For ordinary pearl starch, 14% is not considered excessive. Thin boiling starches will vary between 10% and 12% when shipped, and under very damp conditions they might pick up more. (C) Cornstarch, 12 to 13%; potato, 18 to 20%; tapioca, 12 to 13%. (D) Amounts variable according to use, 10 to 12% being the usual figure. (E) Moisture on pearl starch will run about 12% and should not run over 13%. Moisture on powdered starch will run about 11 to 11½%, and should not run over 12½%. (F) Corn, 13%; sago, 14 to 15%; potato, 17 to 20%; wheat, 15%. You can see that you have some leeway with the various starches.

Soluble Matter Allowable

(A) On raw starches the amount of soluble matter will be below 3%, but on converted starches and dextrines it will run, according to the degree of conversion, to any figure up to the dry content of the product in question. (B) The water-soluble also varies according to the treatment of the starch. Most starches contain only 0.1 to 0.5% water-soluble, but the highly modified starches may contain 50% or even more soluble matter. (C) Amounts in thin boiling starches of the lower fluidities vary from 0.2 to 0.5%. In higher fluidities they run higher, according to uses. In the untreated starches the amount varies from 0.04 to 0.1%.

Several methods were recommended for this test also, and we finally used this one: Stir 10 grams of the starch with about 450 c.c. of distilled water for fifteen minutes. Transfer to 500 c.c. graduated flask and make up to the mark. Shake well and allow to settle. Filter off 250 c.c. Evaporate to dryness on the water bath. Dry in the oven and weigh. Then make calculations.

*These tests are tabulated in the July 14, 1928, issue of Textile World.

The charts in Textile World gave a good idea of the results of both these tests on the North Carolina mill samples.

Ash, Grit, Color and Pasting Points

These were reported in the August 11, 1928, issue of Textile World in regard to our tests at the college. In speaking of the value of the ash test, Dr. Cathcart remarked: "The ash is of importance because some industrial starches have various inorganic substances added to them for the purpose of modifying in some way the cooked starch pastes. Various alkalies are use; borax, phosphates, chlorine salts, etc."

Of the various ash tests recommended, we used the following: Two grams of starch weighed into a tared platinum crucible, heated slowly over a flame, then heat raised slowly to a higher degree, after which the crucible is cooled in the desiccator and weighed. All samples run in duplicate or triplicate. [Note: Too sudden heating will cause the starch in some cases to run over edge of crucible.]

A test for grit is sometimes needed in starch to be used in printing, as any grit passing through the strainers would scratch the engraved rollers and cost money. We did not run any quantitative tests, but used this qualitative test: Place a small amount of sample on clean glass, then rub with a spatula or another piece of glass. If any grit is present it can be detected by the scratchy feeling. Another simple test is to place a small amount between the teeth.

Temperature control dealers, as well as others, bring up the question of temperature control in making starch pastes. All starches do not paste at the same temperature, so why use extra steam or other heat if not needed? Also, some of the pastes become thinner when boiled too long. In prolonged boiling, starch gradually changes to other substances, such as sugar or dextrose, etc., and these substances do not give the results which are obtained with starch. In a series of tests made several years ago we found that potato and tapioca would paste at 65° or below, corn around 75°, and wheat, rice and arrowroot were around 80° C.

In making pasting point tests at the college we worked the following method: Four grams of the sample were fixed with 100 c.c. of cold water, and one drop of the well-mixed solution was then transferred to one corner of the microscope slide. Then the mixture was slowly heated on a water bath with constant stirring, and at temperatures of 50, 55, 60, 65, 70, 75, 80 and 85° C. a drop was removed and placed on the slide beside the other drops. After the drops were cooled they were examined with a low-powered mi-

croscope, and it was very easy to note when complete pasting had taken place.

Color Testing

Small amounts of the samples were placed side by side on blue glazed paper and compared for whiteness. Only one of the samples had been doctored by addition of bluing.

Lasting Qualities of Pastes

Some starches form a paste which will liquefy and spoil quickly, whereas others will dry up and form a skin. In sizing compounds, we prefer one that will keep without liquefaction setting in, and as starch sizes are usually used up within a short time we are not troubled much in this way. In printing pastes, if a dry skin forms too quickly it would be necessary to strain the paste again before using it on the printing machines. In our tests we used 5 grams of sample and 100 c.c. of water, and pasted at a boil and allowed it to stand in the open air, and noted results.

pH Values: Acidity and Alkalinity

Professor Mullin has adressed this gathering at various times and has emphasized the pH value tests. In our work at the college we went into this test work, using the La Motte roulette comparator to secure comparative results on the starch samples. A brief description will be given of this outfit and its uses. In the old days we used indicators such as litmus, Methyl Orange, etc., and reported substances as being mild, medium and strongly acid or alkaline. These reports were based on each individual's judgment, and not on a scientifically proven scale. All of our old indicators had a certain range and much of the work was a matter of guessing. With the La Motte apparatus we use a greater number of indicators of more limited range, some of the indicators overlapping each other in the range. By using these short ranges the chance of error is greatly reduced.

The neutral point with this system is called 7; any number below, such as 6.4, shows acidity, and the lower the number the greater the acidity. Just the reverse is true with numbers higher than 7, which show alkalinity. In the roulette type, an ampoule of distilled water is placed between each two indicators; or, in other words, there are an indicator ampoule, then a distilled water ampoule, then another indicator ampoule, etc. The machine holds three sets of indicators at a time, and there are several more sets of ampoules to cover other ranges, the ampoules being easily exchanged in the machine. A description of the machine and our tests was given in the Textile World of September 15, 1928.

A more accurate way of determining pH value is by electrical conductivity measurement, which is more complicated but can be used in many cases where it is not possible to use the indicator method. In the conductivity method, a tenth normal solution of a weak acid would show the same strength as a tenth normal solution of hydrochloric acid; but the hydrochloric solution would be many times stronger in H-ions, due to the greater dissociation of the mineral acid. In solutions to be tested that contain color, this method could be used where the other method would not be practicable. It is also much more accurate and I expect to see some very interesting reading when Professor Mullin has his works on pH printed.

In the making of the starch at the Corn Products Refining Company, and also at the Stein-Hall Company's dextrine plant, I was much interested to note that they used pH control with the aid of indicators, as used in the roulette comparator.

One starch man said in regard to pH tests: "It is important to determine whether a starch is acid or alkaline, because the resulting starch pastes have different characteristics, depending upon the degree of acidity or alkalinity. We are in the habit of reporting the pH value of the starch."

Viscosity—Fluidity—Plasticity

These terms are often confusing when applied to starch. We hear people talk of the viscosity and fluidity, and then find that no two starch companies have the same degree of one or the other that is actually the same when spoken of in terms of another company using the same number.

In the Textile World of October 13, 1928, you will find the results of our survey on viscosity and fluidity of starches. I will make a few remarks in regard to these terms. Nivling has written as follows: "A salient characteristic of the natural or unmodified starch is that of high viscosity (resistance to flow). This viscous property can be modified, and the term 'modified starch' is frequently used to denote a change in the solution properties. The term 'fluidity' is frequently used in descriptions applied to starches which, by chemical treatment, have been changed from their natural, sluggishly flowing character to a more free-flowing condition. Since, however, it is the viscous rather than the free-flowing property that is the basis of service, the term 'viscosity' finds preference in a technical description of service properties. Owing to the incompleteness of solution of the unmodified or

only moderately modified starches, the term 'plasticity' has been proposed as the only properly descriptive term, and plasticity measurements proposed as the only dependable measurements of starch solutions."

Dr. Cathcart writes as follows: "Cotton fibers, being small twisted tubes or ribbons, are twisted together to form yarn, and so have small spaces between the fibers, extending sometimes across and always lengthwise of the yarn. Because of the capillary attraction of the yarns for liquids, these spaces are filled up when a liquid is applied. Various factors enter into the rapidity with which the liquid is absorbed, such as temperature, fluidity, etc., but fluidity is the most important. The higher the fluidity the greater the penetration.

"Before the development of thin boiling starches emphasis was placed on the thickness of starch pastes, and this property was expressed in terms of viscosity. When the marked advantages of thin boiling starches became established, emphasis was transferred to the thinness of the pastes and is now expressed in terms of fluidity. Viscosity and fluidity are reciprocal terms. High fluidity is low viscosity, and vice versa."

Discussion of Starches for Textile Processing

Prof. Mullin—Would anybody like to ask a question?

Clarence Cone—Is there any standard of moisture that starch should contain?

Prof. Grimshaw—I wrote to the different concerns and found there was none. Each one has his own.

Question—Don't you think it would be more satisfactory to the cotton manufacturers if the starch manufacturers would standardize on their fluidity?

Prof. Grimshaw—They will not do it. Each one has established his own and thinks his is best. I certainly think they would find it an advantage if they would.

Prof. Mullin—I knew Prof. Grimshaw would help us out with his paper. The speaker who was scheduled disappointed us, and I asked Prof. Grimshaw to fill his place at the last moment, as I knew he was familiar with his subject and would help us out.

I will ask Mr. Cameron McRae, of the Arabol Manufacturing Company, to lead the discussion of the paper.

Cameron McRae—I do not know that there is anything I can say to the hosiery man. The difficulty I see is the difficulty mentioned in this starch proposition. There are several things I had in mind. For instance, in the cooking of the various starches he referred to heating cornstarch to 83° C. Do you mean you maintain a temperature of 83° in cooking?

Prof. Grimshaw—Yes.

Mr. McRae—For how long?

Prof. Grimshaw—It varies. Pearl starch will take more time than potato starch.

Mr. McRae—Sixteen ounces to a gallon of water should be cooked how long? Would 80° cook it?

Prof. Grimshaw—Eighty deg. C. would bring it up to cooking, but I prefer it 83°, not higher than 85°.

Question—Why does a thin-boiling starch make a thin paste?

Prof. Grimshaw—Because they did not have as much starch but more dextrine. Starch not being soluble in water and having no other solvent, the modified part is soluble in water and forms a thinner paste.

Mr. McRae—What is the difference in the character of the starch when it is cooked for ten minutes or an hour and a half? The finishing mills cook starch for a very short time.

Prof. Grimshaw—The starch is not entirely pasted and some of the little granules are only partly split open.

Mr. McRae—Is there any greater likelihood of mildew from starch not cooked thoroughly?

Prof. Grimshaw—I have not tried that out.

Mr. McRae—I have found that in some bleacheries they use one kind of starch to get the finish, and in another bleachery they use a different starch to get the same finish. Can you tell by the film which the different kinds of starches make, why in getting different finishes you use the same starches when you might use different starches and get the same finish?

Prof. Grimshaw—If you have one that has been cooked for ten minutes you would not get the same penetration as the one cooked a longer time. It seems to me the smaller the grain the shinier the finish. You remember the shiny finish we used to get on collars in the Chinese laundry? The Chinaman used rice starch and got that glossy finish.

F. G. LaPiana—How do various starches affect the finish?

Prof. Grimshaw—The potato starch and some of the other starches form a translucent finish. The wheat, rice and corn starch form an opaque base. The translucent starch will let light through. Some starches make a paste that is smooth and some of them are more granular. The potato starch gives a smoother finish than cornstarch.

Your rice starch is in small granules. Cornstarch is brittle.

Dr. Mullin—I would certainly feel out of place if I were to introduce Mr. Chase. He has been with you so often and taken part in so many discussions that I know it is not necessary to introduce him, and I am going to ask him to conduct this discussion himself.

Discussion on Machine Dyeing

Harold M. Chase—I have been requested to lead the discussion on some questions on the subject of machine

dyeing, that is to say, beam and package dyeing. The time is getting short and I think with the interest that has been shown, two papers would be sufficient, but as these questions are on the program a brief discussion may be of interest.

I am going to ask the package and beam dyers present to let us hear from them if they have anything of interest on these questions. I know there must be quite a number here who are interested in this type of dyeing.

The first question is: "What causes split beams?" and the second is: "What causes beams to leave the head and what causes beams to be streaked?" I think we can take up these three questions together. Will someone who has had experience of this sort please speak up. I don't hear any answer. Perhaps no one has ever had split beams. (Laughter.)

Mr. Sandridge—I suggest you tell us about it.

Mr. Chase—I did not come here to tell all that I do not know, but am sure that some of you have had these experiences. I know that I have. Our beams have a smaller barrel than some of the more modern ones, and we put 300 pounds of yarn on them, the yarn being something like five inches in thickness. It takes from 25 to 45 pounds of pressure, depending on the density of the yarn, to establish a good circulation.

It has been aptly said that 50% of the success of beam dyeing is dependent on the beaming room, which is quite true. The density of the yarn is of great importance. Moreover, with a beam 16 to 18 inches in barrel diameter, carrying 300 pounds of yarn, the depth of yarn to be penetrated is considerably decreased as compared with a beam having a barrel diameter of only 12 inches. Perhaps those who have only used the large barrel have never had any trouble with split beams. Personally I have had beams split from the outside practically to the barrel. I have also seen beams in which the yarn had left the head an eighth of an inch or more. I would like to have someone tell us why this is.

Mr. Gryder—I really believe you have the split beams more in mercerized yarn because the mercerizing action causes the yarn to shrink and when it is wet it loosens up. As for streaked dyeing, I believe you will find that it is caused more or less by the yarn being wound parallel. If the yarn is slightly cross-wound you will eliminate streaking to a great extent. Of course, poor yarn and mercerization will cause streaking.

Mr. Chase—One cause of split beam is, I think, the more or less colloidal quality of the dyestuff solution, which makes it slightly more viscous, hardly enough to determine it in the laboratory, but enough to prevent it from passing freely through the yarn. The solution may not contain sufficient insoluble matter to collect on the outside of the beam, but nevertheless it will not pass freely through the yarn, which eventually gives way at its weakest point. This trouble may not affect the large barrel beam as much as the small barrel, but I have found that it is necessary to select dyestuffs with a certain amount of care, as some will give trouble and some will not.

Has anyone had trouble with dull, dirty threads near the end of the beams?

No one seems to have had that either. Before long I will have the reputation of being the worst beam dyer in this gathering.

I have seen in our own dyehouse little streaks on the selvedge of cloth made from beam-dyed Hydron Blue. We traced these to a simple thing. We had a great many beams and found that a beam which had been used for black would get mixed up and be used for blue. This would give a few dirty threads near the head of the beam.

The next question is: "How much water is left in a beam after blowing with compressed air and how much when sucked out by vacuum?"

Mr. Johnson—On the vacuum type with around 21 inches vacuum you get as high as 60%.

Mr. Chase—That is, 100 pounds of dry yarn would have 60 pounds of water.

Mr. Johnson—You take out 60% of the moisture: 100 pounds of yarn would have 40 pounds of water left in it.

Clarence Cone—There is no need of leaving any water in that beam.

Mr. Chase—We would like to hear how that is done.

Mr. Cone—I am not here to sell anyone's machinery for them, but there is a concern in Gaston County that takes out all the water. We have one at Gibsonville. It is a drying machine that takes it all out. I would be mighty glad to show it to you. This machine will dry from five to ten beams at a time.

Mr. Chase—Yes, but the coal pile will complain if it has to dry twice as much. It is important to get the maximum amount of water out so your drying machine will have more efficiency.

Mr. Coplan—I would like to ask how long it requires to take this moisture out and to dry the beam; what size beam is the gentleman drying and how long does it take to dry, say 200 pounds?

Mr. Cone—Two hundred pounds will take about two hours.

Mr. Suttenfield—It takes us from eight to ten hours on 200 pounds. I have one of the machines he refers to.

Mr. Chase—Which is best, extracting by vacuum or extracting by blowing out? I would suggest that someone give his experience on blowing out from the inside and from the outside. In our own system the air is put on the outside and blown through towards the center. One hundred pounds of dry yarn carries with it after

blowing approximately 90 pounds of water. The air pressure used is generally around 40 pounds.

I recently saw a beam blown out from the inside and the figures showed that it had only 20 pounds of water left in it per 100 pounds of dry yarn. It was a surprise to me. I have never been able to do anything like that with the compressed air system from the outside in. I am sure that the results were carefully taken, and unless there was some mistake there was only 20% of water left. But as to the difference between pressure and vacuum, I cannot tell you. The statement made a few minutes ago that there was 40 pounds of water left per 100 pounds of yarn by the vacuum system would appear to be in favor of that system.

E. J. LeForte—Is there anyone here who has a drying apparatus who can give us more information than Mr. Cone has given us? He says he takes out every bit of the water in the beam in two hours.

Mr. Cone—I said 200 pounds of yarn. We are putting 350 pounds on our beams and it takes about 3½ hours to dry 350 pounds. The air is blown through from the inside.

Mr. Chase—Our dryer takes about six to eight hours to dry four sets of packages.

Mr. Coplan—On package drying I dry a package in about four to five hours. I also want to say that after you extract with vacuum you can turn on 60 pounds of pressure and still get a little water.

Mr. Thompson—Do you think it would be possible to make a machine to take the moisture out by revolving the beam to throw the water off while the hot air was blowing through?

Mr. Chase—I think that would be quite possible.

Now as to the next question: What success have any of you had in making absolutely uniform cuts of cloth from yarn dyed on the beam? Can you pile those cuts up on a truck and are they all alike or is there a difference in those from the outside, inside and middle zone of the beam?

Mr. Coplan—I think there is a difference.

Sizing Dry and Wet Beams

Mr. Chase—How do you find wet beams size along with dry beams? If you want to make a stripe and have two wet beams and two dry beams, do you have any difficulty in slashing?

Mr. LeForte—I think you would have to put more friction on your dry beams than on your wet ones unless you are drying your beams. Then you could get the same friction.

Mr. Chase—At the mill where I saw the beam blown out which had such a small content of water, they did not have a drier, consequently when they had to slash a dry beam with a wet beam they put the dry one in the dyeing machine and wet it and then blew out the water.

Mr. Chase—What difficulties are encountered in bleaching beams and packages? Mr. Gryder, have you had any experience in that?

Mr. Gryder—To a limited extent. There are some compounds on the market that do bleach fairly well, but as a whole I cannot say that machine bleach, that is, package machine bleach, is satisfactory unless the machine is lined with cement or some other compound; you can get somewhat of a white but you cannot say it is a good bleach.

Mr. Chase—Is that the general experience?

Mr. Cone—Are you referring to beam dyeing or raw stock dyeing? We do package dyeing, that is to say, raw stock.

Mr. Chase—I was referring particularly to the treatment of tubes, cops and beams. Mr. Johnson, do you do any bleaching?

Mr. Johnson—Yes, we have some difficulty. It is not perfect but is more of a soaking process. It is not done on a circulating machine.

Mr. Chase—Does that penetrate all the way through?

Mr. Johnson—Yes. We do it on surgical supplies, gauzes, bandages, etc. We get a very nice bleach.

Mr. Chase—We have a bleaching machine in which we bleach eight beams at a time. The pumps and pipes are bronze and the kiers are lined with rubber. We get very satisfactory results. We use chlorine. We have a large 1-ton drum of chlorine in the room and connect it through a lead-lined pipe to the suction of the pump, then fill the kier with water, caustic soda and soda ash, start the pump and let the chlorine into the suction. To get the best results, of course, you should boil out with caustic soda, but I have always been afraid that it would disintegrate the rubber lining to the kiers.

Water Troubles in Bleaching

Mr. Coplan—Do you have any trouble with the yarn next to the bottom?

Mr. Chase—When we first started bleaching these beams we could not get them right. The water looked clear, but still the beams were slightly yellowish, so I decided to filter the water more. We filtered it through cotton several times and the difference was astonishing. The water was now crystal-clear and we had no further trouble.

Mr. Coplan—That is where I always found the trouble.

Mr. Marlowe—I had an experience once that was very interesting, and I came to a conclusion that may or may not be correct. I found that with caustic and oil or caustic and soda ash and oil it was almost impossible to eliminate that yellowness. I found that, in ad-

dition, the use of colloidal alkali would hold the impurities in such suspension that it pretty well rinsed out and we had almost a clean package.

Mr. Suttenfield—In regard to the deposit which the gentleman said he found on the outside and inside of the beam: last summer several instances of that trouble were called to our attention, and we found in a number of cases it was due to a deposit of green algae in the water which you could not detect. You can usually determine whether you have the algae in the water by holding a piece of cotton under the faucet for ten or fifteen minutes and, after removing it, if you have a green deposit you have this green algae floating in the water. When you run water through the cotton it acts as a filter, and when you bleach it and remove the chlorine you remove the color from the algae and leave behind a brown, dead organic substance. This will cause your bleach to be dull, and if the algae are numerous you will find at the bottom of your kier a thick brown deposit.

Indigo in Beam Dyeing

Mr. Chase—Can a heavy shade of Indigo dyed on beam or packages be slashed along with white warps?

Mr. Sandridge—How can you dye a heavy shade of Indigo on beams? I have never seen anyone dye more than 5% or 6% of Indigo on beams.

Mr. LeForte—You can dye 8% but it will take nearly 25% of Indigo to do it.

Mr. Chase—Having dyed a beam with Indigo, how does it slash along with white beams?

Mr. LeForte—You can dye it by the regular process with the addition of perborate of soda, but it has to be finished differently from warps.

Mr. Chase—I am speaking of half Indigo and half white. For example, if you take two beams of each and run them through the slasher, is the result satisfactory, or does the Indigo bleed onto the white?

Mr. LeForte—If you wash it with perborate of soda it does not strip.

Mr. Chase—How much Indigo is required to produce a given shade on beams compared with the amount used for the same shade in chain dyeing, and does the same relation apply to other vat colors?

Mr. LeForte—I would say in this case that in order to obtain either a 6% or 7% shade on the beam you must use nearly 22% of Indigo in the vat, while you do not need to use that much on warp.

Mr. Chase—After you have your standing bath, does it take more Indigo for the beam-dyed than for the chain-dyed yarn?

Mr. LeForte—It does; on account of the penetration in the fiber. You get better penetration in the beam than on the warp, because the beam lies in the dyestuff longer. When we dye Indigo—that is, on the beam—we run it an hour and thirty minutes in the dye bath and it takes in the neighborhood of nearly 5 to 6% more to dye on the beam than on the long chain, but you get a better penetration.

Mr. Chase—Our experience practically agrees with that. We also find that more Indigo comes off from the beam-dyed yarn in slashing than from the chain-dyed yarn. In chain dyeing you can thoroughly strip off the surplus Indigo, especially if you have soap in the last bath. On the beam-dyed yarn you cannot wash the beam until you have oxidized it, because the reduced Indigo is soluble in cold water. If you use compressed air it is well to be careful and not use too high a pressure, or some of the Indigo may be stripped off before it is oxidized. Our practice is to blow it steadily for about fifteen minutes with air at 20 pounds pressure. On washing, a considerable portion of the oxidized Indigo is held in the beam, as it is insoluble. Consequently, beam-dyed Indigo tends to rub and bleed more than chain-dyed. I believe, however, that the beam-dyed yarn holds its depth of color better than chain-dyed yarn, there being more Indigo in the yarn; so that after a number of washings, while it bleeds more, yet it retains more Indigo than the chain-dyed yarn.

Mr. Coplan—Why does Mr. LeForte get better penetration on the beam?

Mr. LeForte—I would answer that in the beam-dyed yarn you have a forced penetration through the fiber and you have an hour and a half that it lies in the dye bath, while in warp dyeing you have only a short time in the vat. The warp will be better penetrated by other vat dyes than by Indigo, because with Indigo it is more of a paint dyeing than a penetration.

Mr. Coplan—In dyeing Indigo you dye in a cold bath?

Mr. LeForte—We do. If you run your Indigo at 120° you do not get the same percentage of Indigo that you do in the cold bath unless you are using the old molasses bath which we used years ago.

Mr. Chase—I agree more or less with both of you. In dyeing vat colors which are, of course, similar to Indigo, you save a considerable amount of dyestuff in chain dyeing as compared with package dyeing, especially on heavy shades. While most of the vat colors penetrate better than Indigo, yet it is my experience that there is a considerable difference in the amount of dyestuff required to produce a given shade by the two methods and that this difference is in favor of chain dyeing.

Mr. Coplan—Did I understand you to say that you get a heavier shade on warp than on packages.

Mr. Chase—It takes more dyestuff on packages than on chain warp. In general, if you circulate the dye-

stuff through the cotton as is the case in package dyeing you penetrate every fiber. Mr. Ephland can tell us something about this. Mr. Ephland, in dyeing warps with vat colors, do you think you penetrate the warp perfectly?

Mr. Ephland—No, I do not think so.

Mr. Chase—It is my experience that you do not. If you will untwist the chain-dyed yarn you will find a faint white center. In the case of Indigo any yarn heavier than 30s will be white in the center.

Mr. Coplan—Don't you think there will be more dyestuff left in your tubs after you are through with a warp dyeing?

Mr. Chase—Unquestionably. In warp dyeing the question of what is left is important. In the long run it might be cheaper to dye on a package machine, but what I meant was that it takes actually less dyestuff on the yarn to produce a given shade than it does on the package. You lose very little in the package machine, whereas in warp dyeing there is always considerable dystuff left in the bath, as it is impossible to exhaust it completely.

Mr. Ephland—To save money I have been doing this: I run one set of warps and then run another set behind it and exhaust the bath. With some colors I can get nearly the same shade on the second set that I get by dyeing in the regular way.

Mr. Coplan—When you make your next addition do you use your full formula on that?

Mr. Ephland—I do not get the same every time. Sometimes by making two runs after dyeing a set of warps I get nearly the same shade that I am dyeing. Then I add a little bit.

Mr. Coplan—Do you use the same formula the second time?

Mr. Ephland—No.

The Naphthol Colors in Package Dyeing

Mr. Chase—With one or two more questions we will cut short the discussion, as it is getting late.

Can Naphthols be dyed with entire satisfaction on packages? Mr. Johnson can tell us something about that.

Mr. Johnson—I have been troubled with some crocking. I would like to hear some discussion on that, as to whether you can finish Naphthol Red so that it will not crock.

Mr. Bean—I have been dyeing Naphthols on packages and dyeing vats on packages, and I can say that I can dye Naphthols on packages that will not crock any more than heavy vat colors. It can be done and will not crock any more than a heavy shade of vat color, dyed in packages. It crocks a little bit with a severe crocking test, but I have seen some very sorry Naphthols dyed on packages.

Mr. Chase—Do you think it crocks more next to the tube than on the outside of the package?

Mr. Bean—I do not see why it should, if it is properly dyed.

Mr. Chase—Do you use air or vacuum to remove the excess liquor or do you simply wash after the prepare?

Mr. Bean—I simply wash out with brine.

Prof. Mullin—I remember visiting the Ober plant in Germany where they did all this experimenting. I saw them dyeing Naphthols on practically every form of yarn. To avoid the crocking, after the stuff was opened up it was put through a soap washing machine with brushes revolving under the surface. The piece goods were given a scouring with revolving brushes, but they did have some crocking. When I was there they had just put in a new machine with which they expected to get better results. Probably some of you who have been there remember Dr. Schaefer. He said that a great deal depended on how dry they got the package before they completed it.

Mr. Ekerstrom—Did they put the Naphthol in solution in oil or alcohol?

Prof. Mullin—I think they were using alcohol, but I cannot say that they did in every case. It was quite a large plant and I did not go into all the details. I spent more time on the new Naphthol Red and the new blue they had than I did on some of the other details. They had some very interesting skein dyeing machines for Naphthols. I made a number of notes at the time that I intended to write up but due to the criticism I received on some of the notes I did write up, I discontinued the articles.

Question—Does anyone know what effect on crocking of Naphthol the use of oil or different types of oil has? What effect does the oil used in the pasting of Naphthols have on the Naphthol after it is used?

Mr. Chase—My opinion is that it is a question of dispersion. Naphthol solutions are apparently colloidal. The more finely they are dispersed the more completely they are absorbed by the fiber. Mr. Akerstrom can probably tell us something about the use of alcohol instead of oil. What is your experience, Mr. Akerstrom?

Mr. Akerstrom—I have not had much experience with it.

Mr. Chase—I understand the method of pasting with alcohol has given better results than anything else, although I myself am not familiar with it.

Mr. Gaede—I heard the statement made that an excess of oil used would cause more crocking than when a smaller amount was used. I wondered if the use of alcohol was to prevent crocking or was it simply a different method of making up the prepare. Is the alcohol supposed to reduce crocking?

Mr. LeForte—I think myself that alcohol will be more

beneficial to the yarn than the cheaper oil or any kind of oil would be, because there are lots of oils, and you do not know which kind you are using, and the oil would be more apt to make your goods crock than the alcohol.

Mr. Chase—If there is no further discussion on Naphthol, I think we had better call it a day.

. . . Upon motion the meeting adjourned at 11 p. m.

FIFTY-SEVENTH COUNCIL MEETING

THE Fifty-seventh Council Meeting of the Association was held at the Chemists' Club, New York, 12:15 o'clock Friday afternoon, March 8.

The following officers and councilors were present: President E. H. Killheffer; Vice-Presidents W. S. Williams and P. J. Wood; Councilors Ralph F. Culver, William R. Moorhouse, Hugh Christison and Walter M. Scott; Councilors ex-officio William H. Cady, Chairman Northern New England Section; Richard B. Earle, Chairman Rhode Island Section; Daniel P. Knowland, Chairman New York Section; A. M. Burt, Chairman Philadelphia Section, and Prof. L. A. Olney, Chairman Research Committee; and Secretary Alex Morrison.

The reading of the Secretary's report of the Fifty-sixth Council Meeting was waived, as it was published in the Proceedings of February 4, 1929.

The Secretary reported that a meeting of a few members of the Association had been held at the Lowell Textile Institute on February 6, 1929, for the purpose of organizing the Association as a corporation. The reading of the minutes of this meeting was waived on account of lack of time and pressure of other business, but they are given herewith:

Meeting for Organization of Corporation of American Association of Textile Chemists and Colorists

Lowell Textile Institute, Lowell, Mass.
February 6, 1929

A meeting of the following:

George A. Moran, 98 Massachusetts Avenue, North Andover, Mass.
Lawrence F. Ryan, 16 Argyle Street, Andover, Mass.
John H. Shinkle, 295 Appleton Street, Lowell, Mass.
Harold W. Leitch, 11 Locke Street, Andover, Mass.
Paul J. Shoquette, 89 Butterfield Street, Lowell, Mass.
Charles L. Howarth, Colson Street, North Billerica, Mass.
Alexander Morrison, 5 Canterbury Street, Andover, Mass.
Harold C. Chapin, 290 Pine Street, Lowell, Mass.
Clarence L. Nutting, P. O. Box 172, Salem Depot, N. H.
Hugh Christison, 80 Pleasant Street, Methuen, Mass.
Louis A. Olney, 118 Riverside Street, Lowell, Mass.

members of the Association, was held at the Lowell Textile Institute, Lowell, Mass., February 6 at 8:15 p. m., an agreement of association having been previously made out and signed by the same eleven members, in which the seven days' notice of the first meeting of the organization was waived and the above time of meeting designated.

Prof. Louis A. Olney was duly nominated and unanimously elected temporary chairman.

Dr. Harold C. Chapin was nominated and unanimously elected by ballot temporary clerk.

Dr. Harold C. Chapin was next sworn to the faithful and impartial discharge of the duties of his office by Bertram Grenville, notary public, of Methuen, Mass.

It was moved, duly seconded and voted that the constitution of the American Association of Textile Chemists and Colorists as printed in the Year Book should be adopted as the constitution of the incorporated association.

Winthrop C. Durfee, of Boston, was nominated and elected Treasurer by ballot.

Alexander Morrison was nominated and elected Secretary by ballot.

Messrs. Durfee and Morrison, together with George B. Moran and Hugh Christison, were duly nominated and elected councilors by ballot.

Alexander Morrison was then sworn to the faithful and impartial discharge of the duties of his office by the above-mentioned Mr. Grenville.

Attest:

(Signed) HAROLD C. CHAPIN,
Temporary Clerk.

The meeting adjourned at 9.05 p. m.

Attest:

(Signed) ALEXANDER MORRISON,
Secretary.

Meeting of the Councilors Following Meeting of Organization of Corporation

Lowell Textile Institute, Lowell, Mass.
February 6, 1929

FOLLOWING the adjournment of the meeting of Organization of Corporation at Lowell Textile Institute, Lowell, Mass., February 6, 1929, at 9:05 p. m., the three councilors present, George A. Moran,

Hugh Christison, Alexander Morrison, being the majority of the four elected, held a meeting and elected Elvin H. Killheffer, of North Caldwell, N. J., as President; Walter S. Williams, of East Norton, Mass., and Percival J. Wood, of Paterson, N. J., as Vice-Presidents; and four additional councilors: Walter M. Scott, Severna Park, Maryland; William R. Moorhouse, 33 Fifth Avenue, New York, N. Y.; Ralph F. Culver, 228 Freeman Parkway, Providence, R. I., and Benjamin S. Phetteplace, 200 East Prentiss Avenue, Greenville, S. C.

Meeting adjourned at 9:20 p. m.

Attest:

(Signed) ALEXANDER MORRISON,
Secretary.

The necessary documents of this matter were filed at the Massachusetts State House, Department of Corporations and Taxation, on March 5, and the actual charter is expected to be received in about two weeks.

* * * *

The following applicants were elected to membership in the Association:

Active Members

Apsey, Jr., George Wills, chemist, Jacques Wolf & Co., Passaic, N. J. Address: 99 Gregory Avenue, Passaic, N. J.

Bishop, Claude E., salesman, Chemical & Dye Corporation, Greensboro, N. C. Address: 1203 P. O. Box, Greensboro, N. C.

Chapman, Thomas H., salesman, John Campbell & Co., New York, N. Y. Address: 703 Oswego Street, Utica, N. Y.

Dunlap, Earl S., colorist, "E Cut" Knitting Company, Royersford, Pa.

Gensheimer, Joseph M., salesman, General Dyestuff Corporation, New York, N. Y. Address: 25 Elm Place, North Bergen, N. J.

Heckman, Raymond C., foreman-dyer, E. Richard Meinig Company, Reading, Pa. Address: 1433 N. Twelfth Street, Reading, Pa.

Keating, William A., Boston manager, Newport Chemical Works, Boston, Mass. Address: 68 Devonshire Street, Boston, Mass.

Lockhart, George R., manager, Woonsocket Rayon Company, Woonsocket, R. I. Address: 341 Cole Avenue, Providence, R. I.

Maurer, Edward, chemist, Carbic Color & Chemical Company, New York, N. Y. Address: 24 Columbia Avenue, Moresmere, N. J.

May, Paul O., manager, Color Service Corporation, Chicago, Ill. Address: 509 North Wells Street, Chicago, Ill.

Newcomb, Guy H., sales manager, E. I. du Pont de Nemours & Co., Philadelphia, Pa. Address: 128 S. Front Street, Philadelphia, Pa.

Roberts, Thomas H., manufacturing chemist, Arnold, Hoffman & Co., Providence, R. I. Address: 78 Shaw Avenue, Edgewood, R. I.

Seltzer, William, chemist, Jacques Wolf & Co., Passaic, N. J. Address: 114 Autumn Street, Passaic, N. J.

Sullivan, James P., salesman, Carbic Color & Chemical Company, Providence, R. I. Address: 1026 New Industrial Building, Providence, R. I.

Todd, Robert J., colorist, National Aniline Company, Chicago, Ill. Address: 357 West Erie Street, Chicago, Ill.

Zeil, Henry G., chief colorist, Carbic Color & Chemical Company, New York, N. Y. Address: 74 Church Street, White Plains, N. Y.

Junior Members

Golden, Andrew C., student, Bradford Durfee Textile School, Fall River, Mass.

Harris, Henry L., chemist, Golden Belt Manufacturing Company, Durham, N. C. Address: Y. M. C. A., Durham, N. C.

Stewart, John W., student, Lowell Textile Institute, Lowell, Mass. Address: 28 Mount Washington Street, Lowell, Mass.

Associate Members

Carothers, J. N., vice-president, Federal Phosphorus Company, Anniston, Ala.

Griffith, Robert S., salesman, Jacques Wolf & Co., Passaic, N. J. Address: 445 Madison Street, Carlstadt, N. J.

Royce, Albert J., field manager, Jacques Wolf & Co., Passaic, N. J. Address: 8 Garfield Street, Clifton, N. J.

Travis, John T., sales manager, Textile Division, American Gas Furnace Company, Elizabeth, N. J. Address: 41 Burlington Avenue, Paterson, N. J.

Three applications were referred back to the secretary.

It was voted to approve the reinstatement of: Prof. Bruce E. Hartwell, H. J. Daigneault, B. C. Bond, B. B. Fernald, B. L. Hathorne, Joseph Houth, Jr.

It was voted to transfer H. G. Smolens from an Associate to an Active member.

In reference to inquiries received from libraries for

copies of the Year Book, it was voted "that libraries could have copies of the Year Book for $2.00."

In reference to letter from Meyer Fleischmann in regard to abatement of dues of 1928, due to the lateness of his election, August, 1928, it was voted "that this could not be done, but that if Mr. Fleischmann wanted back numbers of the AMERICAN DYESTUFF REPORTER for 1928, the secretary should send them to him."

In reference to a letter from the New York Section regarding time of electing a member of Nominating Committee, it was voted to allow the Section to take their regular course and elect this committeeman at their regular annual meeting in May as is their custom.

It was voted that President Killheffer should attend a meeting of members in the Middle West to be held in Chicago, Ill., March 16, 1929. Dr. Killheffer was empowered to represent the Council, to receive and approve a petition from these members to form a local section if they so decide. If this petition is offered, Dr. Killheffer is empowered to act as temporary secretary with power to form the local section in the Middle West and decide upon name and boundaries after discussion of the subject with the members of this territory.

Considerable discussion followed presentation of several bills for a clerk in the Treasurer's office. The President was empowered to take this matter up with the Treasurer, and endeavor to bring about a satisfactory settlement.

The Secretary reported that the Treasurer had sent him a list of delinquent members, and notices and bills have been sent out.

A general discussion of details of handling matters in the Secretary's office took place. It was decided that all moneys be received by the Secretary, and for the present at least that he deposit them as received and turn them over to the Treasurer at intervals. All bills will be received by the Secretary who will make out vouchers to be duly approved and sent to and paid by the Treasurer. No definite action was taken on setting the remuneration of the Secretary's clerk.

No date was set for the next Council meeting.

The meeting adjourned at 2.10 p. m.

ALEXANDER MORRISON,
Secretary.

Applicants for Membership

Active Membership

Bragg, Harold N., foreman dyer, Wayne Knitting Mills, Fort Wayne, Ind. Sponsors: Arch J. Mease and Arthur T. Brainerd.

Dogin, Louis J., demonstrator, American Aniline Products Company, 45 East Seventeenth Street, New York, N. Y. Sponsors: Walter E. Hadley and J. J. Sokolinski.

Escoett, S. Ion, vice-president, Washline National Sands, Baldwin Street, Bronx, New York, N. Y. Sponsors: Walter W. Hales and Benjamin Kapp.

Krais, Dr. Paul, director, Research Institute, Weinerstrasse 6, Dresden, A.1, Germany. Sponsors: E. H. Killheffer and Louis A. Olney.

Lenz, Rudolph V., assistant manager, General Dyestuff Corporation, 159 High Street, Boston, Mass. Sponsors: Alvah H. Pierce and William H. Cady.

Lever, Cyril, chemist, W. H. Burns Company, 4060 Orchard Street and Third, Philadelphia, Pa. Sponsors: A. M. Burt and H. J. Bogan.

Lever, C. Wendall, textile chemist, Wood Mill, Lawrence, Mass. Sponsors: Alex Morrison and Walter M. Sullivan.

Loue, William, foreman printer, 363 Borden Avenue, Long Island City, N. Y. Sponsors: Courtney E. Moorhouse and George Betsch.

Meltzer, John A., colorist, National Aniline & Chemical Company, 357 West Erie Street, Chicago, Ill. Sponsors: Edward Weber and F. J. Acker.

O'Malley, Jack, dyer, Colingborne Mills, 367 Jay Street, Elgin, Ill. Sponsors: A. T. Brainerd and C. E. Maher.

Palmer, John A., consulting chemist, P. O. Box 269, Auburn, N. Y. Sponsors: Frank C. Holden and Daniel P. Knowland.

Proudfott, F. H., salesman and demonstrator, Nyanza Color & Chemical Company, 549 West Randolph Street, Chicago, Ill. Sponsors: Arch J. Mease and Arthur T. Brainerd.

Thompson, Charles, chemist-colorist, Baer Brand Hosiery Company, Experimental Department, West Avenue and Merchant, Kankakee, Ill. Sponsors: John W. Kopf, and Arthur T. Brainerd.

Schmidt, Morris F., district manager, Newport Chemical Works, Inc., 437 East Allegheny Avenue, Philadelphia, Pa.

Junior Membership

Field, Jr., Roddy A., student, North Carolina State College, Raleigh N. C. Sponsors: Albert H. Grimshaw and James W. Black.

Harrison, W. J., foreman, silk dyeing department, J. & P. Coats, Inc., Pawtucket, R. I. Sponsors: A. N. Dana and A. N. Graves.

Howell, R. E., chemist, technician, Staley Sales Corporation, 826 Montgomery Building, Spartanburg, S. C. Sponsors: Charles E. Mullin and Thomas J. Nuckolls.

Changes of Address

Bloxham, Charles W., Ashland Avenue, Southbridge, Mass.

Fish, Harry G., 60 Cedar Street, Penns Grove, N. J.

Hillman, Bernard S., 91 Caroline Street, Derby, Conn.

Mease, Arch J., 600 James Street, Apartment 205, Syracuse, N. Y.

Pollock, Martin, 503 Pierce Avenue, Long Island City, N. Y.

Remick, Lawrence E., Mount Holly, N. C.

Sargent, Robert E., 46 Torrey Street, Dorchester, Mass.

Savage, John, care of Clark Thread Company, Bloomfield, N. J.

ASSOCIATION BADGES

The lapel button badge illustrated herewith is worn by members of the American Association of Textile Chemists and Colorists.

The three "rings" are enameled in red, yellow and blue, respectively, and the initials and border are brought out in gold. The general effect is exceedingly attractive.

Badges may be secured at $1.50 each by addressing the Secretary.

ALEX MORRISON,
American Woolen Co.,
Andover, Mass.

AMERICAN DYESTUFF REPORTER

Devoted to the use and application of dyestuffs and the mechanical equipment incidental thereto.

LOUIS A. OLNEY
PROFESSOR OF CHEMISTRY AND DYEING, LOWELL TEXTILE SCHOOL
Directing Editor

CLAYTON HOAGLAND
Managing Editor

MYRON DREW REESER
Advertising Manager

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THE DYE TARIFF IN THE BALANCE

THE smoke of discussion and argument should have rolled away by this time in the Congressional chambers where the Ways and Means Committee recently held its lengthy hearings on tariff revision. The real work of sifting down the testimony submitted by those who spoke for American industrial interests is now well under way and the new tariff bill, it is believed, will be reported to Congress by April 20. The destiny of many an industry hangs to-day by a slender tariff thread, and in scarcely a month we shall know the worst and the best. Meanwhile, with the atmosphere cleared for a time of all propaganda and argument, we may view more calmly the situation as it stands.

Extensive changes in the present tariff rates are unlikely, according to reports from those who should know. Such at least is the opinion of authorities like Representatives Willis C. Hawley, chairman of the Ways and Means Committee, and John Q. Tilson, Republican floor leader. The Republicans are not to be stampeded into a wholesale revision of rates, Representative Tilson told the Home Market Club last week. The changes will be limited to necessary adjustments in duties and administrative features.

The fact that both of these gentlemen regard the tariff as essentially a protective measure is in itself consoling. To American manufacturers nothing could be saner than such a candid attitude. Why confuse the issue with such bewildering complexities as those introduced into the hearings at Washington during the past eight weeks?

But the tariff is a complex piece of machinery. A new tariff cannot be framed and set going smoothly by any simple doctrine of protection. For there is protection and protection—adequate and inadequate; there are various assorted methods of valuation to consider as well as rates, various methods of administration as well as specific and ad valorem duties. Part must fit part cleanly as in any good machine—though seldom, if ever, is such an ideal condition attained by tariff framers. Their onus is heavy. They are human and can do no better than what their combined knowledge, judgment and experience may dictate as best. They have heard the tariff needs of industry. They have heard those needs supported and attacked. They have listened patiently to witnesses who were for the most part rather selfishly and narrowly motivated by their own interests, witnesses who were also human, and who were guided or misguided by judgments that often found it difficult—nay, impossible—to be independent. The tariff needs of their industry were clear in the minds of each one, and whether or not their needs conflicted with others was certainly not a question to be weighed too heavily while the battle was on. The committee must be shown proof of the needs; convincing evidence had to be presented if needs were to be filled. This, to the last man, was the main thought of each one of the 1,100 witnesses who appeared before the Ways and Means Committee during its seven weeks of hearings.

How strongly and effectively the dyestuff industry's case was presented to the committee has been told in these pages before. But the presentation of the case opened several issues. Those have also been outlined here and commented upon at length; one in particular, the issue of adequate protection, upon which all others hinge; a protection which is to be achieved first by increasing the present rates in paragraphs 27 and 28 and secondly by maintaining the American selling price as the basis of valuation in assessing competitive imports. The numerous reasons for settling the issue of protection by this relatively simple procedure were fully explained in the testimony of the industry's spokesmen at Washington. And the principle was kept foremost in mind that regardless of any other purpose in framing a new tariff, the chief consideration must remain that of *protection* for the domestic industry at precisely those points where protection is most needed.

Specifically, the American dye manufacturers have aligned themselves solidly behind the following principles:

1. No change from American selling price as the basis for ad valorem duty in Pars. 27 and 28.
2. The basis for all other ad valorem duties in the new tariff should be some form of U. S. value, all fundamental data to be gathered here and no form of *foreign* value.
3. The domestic manufacturer should be recognized as a party in interest in all Customs Court litigation, authorized to present his own case instead of merely assisting the Government as at present.

The presentation of their case with these principles clearly in view was, we repeat, not the only action that could be taken on this momentous issue. The industry's brief was strong and not altogether passive in placing its emphasis where it belonged, but that is not enough. It is unsafe to rest our hopes solely upon the testimony and

the brief submitted to the tariff committee. There was and still is an opposition that is far too active to be taken passively. The principles as stated are far too precious in their implications to yield without a strong defense. There should, in fact, be no thought of defeat.

Toward the close of the tariff hearings the issue of American valuation vs. United States valuation became heavily charged with meaning for more than one industry. Some of the best informed tariff authorities have long realized the importance of changing in many schedules the basis for rates applied by value, and the consensus of this informed opinion was in favor of the American selling price plan, now in force in paragraphs 27 and 28.

The distinction between American selling price and United States value as bases for assessing the ad valorem duties on competitive products is so significant that we must not carelessly assume everybody knows that distinction who should know it. American selling price means the selling price of the comparative American-made product in the markets of this country. To assess on United States value, on the other hand, means to deduct from the selling price in this country of the *foreign*-made goods, so much for profit and expenses, so much for freight and insurance, so much for specific and ad valorem duty, and then on what is left the real duty is calculated.

This issue has become of greatest moment to the American dye industry for the reason that in the present tariff the paragraphs covering coal tar products are the only paragraphs on which the American selling price is operative. During the tariff hearings it was clearly shown by the industry's spokesman that this system of appraising competitive dyes and other coal tar products should be kept in force because it guarantees to the industry the measure of protection needed.

There would be little need for this appeal, little need to argue the issue, were there no opposition among those who now control the tariff destinies of the nation. Five years ago, on March 17, 1924, the Hon. James A. Frear introduced in the House of Representatives a bill asking for the repeal of both American selling price and United States value as bases of the ad valorem rates on coal tar products, and urging *foreign* valuation as the basis. This bill violently attacked the administrative clauses of the dye tariff and characterized the American selling price clause as "viciously unfair," "monopolistic" and "unworkable," and asserted that it has resulted in a condition "worse than an embargo." Any intelligent person who has carefully studied the records of our dyestuff imports over the past five years will understand at once how basely false such assertions are. Those who have taken pains to become informed on the issue know very well that at present our dye imports comprise far too great a range of vat colors, and constitute far too high a percentage of domestic consumption by value and by variety to justify any frantic accusations of "monopoly" and embargo.

It should be mentioned further that the Hon. Mr. Frear's bill of attack was unearthed from the archives and duly submitted in full in the testimony of dye importers during the recent tariff hearings and that this action was part of a concerted attack on the American valuation principle. Two weeks ago the same Hon. James A. Frear was appointed to sit on the Ways and Means Committee during the framing of the new tariff to replace the Hon. Charles L. Faust of Missouri, who recently died. Mr. Faust had been in charge of the chemical schedules; the Hon. Mr. Frear will, it is believed, now assume that momentous duty.

It is a grave misfortune to the interests of the dyestuff industry and to all consumers of dyes that the arch-enemy of the American selling price principle, the vociferous advocate of foreign valuation, should now be in the one position in this whole wide world where his particular obsession makes him most dangerous. It is, in common parlance, "a tough break." We in the dyestuff industry can but hold our breath and wait. Another month will show which way the wind of destiny has blown.

CLEANERS STUDY TEXTILE CHEMISTRY

Using the Eight-Hour Day

Realizing that their work involves constant application of organic chemistry, dyers and cleaners of Tulsa, Okla., have organized a class in the chemistry of dry cleaning and garment dyeing under the guidance of a trained chemist. The Tulsa Association of Dyers and Cleaners are directly responsible for this project.

In commenting on the action of the Tulsa dyers, the Cleaners and Dyers Review says: "When the carpenter makes a study of wood, when the baker makes a study of the chemistry of yeast and flour, when the motorman makes a study of the fundamentals of the machinery which he is operating, then we will begin to make use of the opportunities offered by the eight-hour day."

The Rubber Association of America, Inc., has recently issued a revised list of trade names used by rubber clothing manufacturers. The new list contains some 364 trade names registered by manufacturers with the association, and copies may be obtained by those interested on request at the association office, 250 West Fifty-seventh Street, New York City.

William Brosnan, of Lowell, Mass., has just been elected vice-president and general manager of the Antipyros Company, of New York City, fireproofers, dyers and waterproofers of fabrics. Mr. Brosnan is a graduate of Lowell Textile Institute of the class of 1927, with the degree of B.T.C. He will be the manager and technical director of the company.

A. A. T. C. C. HOLDS MEETING TO DISCUSS RESEARCH NEEDS

Textile Industry and Trade Press Represented at Conference on Future Plans

THE need for organized fundamental and applied research on textiles and the means for establishing such research were two of several important questions discussed at a special meeting called by the American Association of Textile Chemists and Colorists at the Chemists' Club, New York City, Friday afternoon, March 8.

Representatives of a number of textile trade associations and large mills and the editors of leading textile publications gathered to hear Dr. E. H. Killheffer, Prof. L. A. Olney and other members of the association explain their attitude toward research as exemplified by the work of the A. A. T. C. C. Research Committee, and to answer their plea for some co-operative plan whereby systematic technical research on textile problems can be financed. P. J. Wood, chairman of the Finance Committee of the Association and a vice-president, acted as chairman of this meeting; Alex Morrison was appointed temporary secretary.

Dr. Killheffer, president of the Association, briefly explained the reason for calling the meeting, and expressed the Association's ideals with regard to technical research. Professor Olney then outlined some of the projects undertaken by the Research Committee, of which he is chairman, and referred briefly to the work of various sub-committees, some of which have been recently formed. Finally, on motion made by George H. Johnson, of the Laundryowners' National Association, it was agreed to appoint a special committee to study thoroughly all suggestions and plans submitted, and to report to the Council what action is to be taken toward establishing some central agency for carrying on co-operative research.

"If one thousand textile manufacturers each contribute $1,000," said Dr. Killheffer, in summing up his proposition, "a fund could be established at once adequate for the purpose of setting up and operating a co-operative technical bureau to carry on fundamental research." He suggested that a testing service for the industry and all other groups, such as laundries or the public, which would have testing problems, would assist in financing the actual research work of such an agency.

Further discussion brought out the encouraging attitude of a majority of those present that $1,000,000 was a modest sum for which to appeal for the purpose of organizing and carrying on the type of research needed by the textile industry. Various plans for financing the project, such as that followed by the Mellon Institute of Industrial Research at the University of Pittsburgh or by the Tanners' Council, were suggested and discussed from the several angles of those present. Dr. Joseph F. X. Harold very cogently outlined the technical bureau plan as originally conceived by the Association, explaining that it was modeled closely on the pattern of similar research institutes operated by the English and the German textile industries, in which local educational institutions co-operated. He stressed the important point that "fundamental research" does not necessarily mean research with no immediate practical objective.

Professor Olney told of the results of a questionnaire sent out by the Research Committee to a large number of mills, the returns from which made it very evident that an unlimited number of concrete problems in textile chemistry and dyeing are awaiting solution, and that in almost every case the problems call for extensive fundamental investigation.

NEW SILK ASSOCIATION MANAGERS TO BE ELECTED AT ANNUAL MEETING

Nominees for election to the board of managers of the Silk Association of America, Inc., will be presented as follows at the fifty-seventh annual meeting of the association, which takes place March 27 at the association headquarters: B. Edmund David, B. Edmund David, Inc.; Paul C. Debry, Duplan Silk Corporation; Beveridge C. Dunlop, American Glanzstoff Corporation; Louis Kahn, Kahn & Feldman, Inc.; H. R. Mallinson, H. R. Mallinson & Co., Inc.; H. Morton Merriman, Belding, Heminway Company; R. J. F. Schwarzenbach, Schwarzenbach, Huber & Co.; C. W. Sinn, Julius Kayser & Co.; John C. Welwood, John C. Welwood Corporation; J. P. T. Armstrong, Corticelli Silk Company; Thomas B. Hill, C. K. Eagle & Co., Inc.

THEODORE R. DANTZ

Funeral services for Theodore R. Dantz, advertising manager of the Du Pont Rayon Company, were held at Newark, Del., March 15, with interment at New London, Pa. Mr. Dantz died in New York City, March 12, as the result of an attack of pneumonia. He was ill for about a week.

Mr. Dantz was born in Avondale, Pa., June 25, 1900. His father, the late William T. Dantz, was at one time editor of the West Grove (Pa.) Independent, and was widely known as an author. After graduating from the West Grove grammer school and the Oxford, Pa., high school, young Dantz entered the University of Delaware, where he completed the arts and science course. After serving for nearly four years as news editor and advertising manager of the Newark (Del.) Post, Mr. Dantz became associate editor of the Du Pont Magazine, a position he occupied for more than a year prior to his promotion in November, 1927, to advertising manager of the Du Pont Rayon Company, with offices in New York City.

THE DYEING OF SILK (ORGANZINE AND TRAM)

(*Continued from page 172*)

Fastness to Rubbing

The fastness to rubbing was recorded, as it is very essential that dyeings of this character are free from this defect. A piece of white mercerized broadcloth was rubbed vigorously for ten seconds with the heavy shade of each dyeing.

Significance of the Tests

The full significance of the light exposure tests is only evident from an examination of the actual exposures, but the information here recorded is sufficient to enable any dyer to choose his dyestuffs intelligently for this class of work and to indicate to him his limitations with regard to fastness.

Assuming the dyestuffs included in this list are among the best available, some of the more obvious limitations with regard to fastness may be set down as follows:

1. The impossibility of getting any pale shades of excellent light fastness. If bright (pure) shades are required, it is impossible to give them of even moderate fastness except in the case of yellows.

2. The impossibility of dyeing a royal blue or a bright green in any depth of shade of satisfactory light fastness.

Yellows.—Of the yellows tested, Sulphon Yellow R and Polar Yellow 5G are obviously the best, the Janus colors being condemned by their poor fastness to rubbing.

Oranges.—The three tested were all very unsuitable; there is really no satisfactory self-color. Orange shades are best dyed with Sulphon Yellow R and Cloth Red G or with Polar Yellow R and Red G.

Reds.—Of the reds, Supramine Red G, the cloth reds, and Polar Red G are all very good. There is not much demand for pinks in this class of work, and where Cloth Red G is not sufficiently bright it may be possible to get the shade by topping this color with Rhodamine.

Violets.—The only violet with very good all-around fastness is Anthraquinone Violet, which is a very poor shade. Wool Fast Violet B, while excellent to water, is deficient in light fastness, and Alizarine Irisol R, while excellent to light, is deficient in water fastness in heavier shades. The Violamines in pale shades are shown to have only moderate light fastness, and in heavy shades their water fastness is not quite satisfactory.

Blues.—Until the advent of Alizarine Supra Sky R—a bright shade of good all-around fastness—the blues as a class were very weak. Violamine 3B is a flat shade, and the Cyananthrols and Alizarine Blues are so deficient in water fastness as to be useless for this class of work. The test indicated that Xylene Fast Blue FF might prove to be a useful color. There is always a demand for very bright blues—from sky to royal—which can only be met by the use of Silk Blues or Victoria Blue; but the light fastness of these dyeings is really quite unsuitable for this trade. As a base for many shades, Indocyanine B has excellent fastness and is much to be preferred to the Sulphon Cyanine brands.

Greens.—The two Alizarine Greens have excellent fastness, but there is no bright green of even moderate fastness.

Browns.—Of the browns tested, Chlorazol Fast Brown RK and Toluylene Fast Brown 2R showed up particularly well, but both, of course, are direct colors. Of the acid colors, Polar Reddish Brown is deficient in water fastness in heavy shades, and its shade is too much of a maroon to be of general service.

Grays and Mode Shades.—For most purposes, Acid Alizarine Gray G is the most suitable dyestuff for grays, and can be shaded with Sulphon Yellow R or with Cloth Red G. In dyeing any wide range of mode shades it is very desirable to have a yellow, red and blue of similar fastness and dyeing properties. Sulphon Yellow R and Cloth Red G, both of excellent fastness, and dyeing from neutral, acetic or even sulphuric acid baths, are very satisfactory colors, but there is no blue of similar properties. The best balanced combination as regards fastness is probably obtained with Sulphon Yellow R, Cloth Red G and Alizarine Cyanine Green G, and if proper precautions are taken with the dyeing excellent results can be produced with these colors for mode shades. The ordinary brands of Alizarine Cyanine Green G require sulphuric acid to exhaust them, and for that reason are not of such general service as the other two. However, there is at least one neutral dyeing brand on the market (a partially sulphonated product) of particular value to silk dyers, since it can be used in a neutral or acetic acid bath, or used for shading direct colors. For some mode shades it may be preferable to use a gray (Acid Alizarine Gray) or a brown for the base. In the latter case, Chlorazol Fast Brown RK is a very suitable color, as the fading preserves very well the character of the original dyeing, whereas a shade built up with, say, Benzo Fast Brown RL would lose its cast completely after a relatively short exposure.

In considering the fastness tests, recommendations for dyeing, etc., given in this article, it should be borne in mind that these refer entirely to the dyeing of fine silk (organzine and tram) when weighted with tannin in the dye bath.

Fred J. Mingst has recently been appointed to the office of assistant treasurer of Pfaltz & Bauer, Inc.

TABLE I

DYESTUFF Those marked * have several American prototypes—See 1928 Year Book A.A.T.C.C.	Colour Index Number	Dyeing Method	FASTNESS TO LIGHT			FASTNESS TO WATER				Fastness to Rubbing Heavy
						MEDIUM		HEAVY		
			Light	Medium	Heavy	Loss	Staining	Loss	Staining	
*Sulphon Yellow R (Bayer)	—	*a* 1 & 2	VG	VG/Ex	Ex	Ex	Ex	Ex	Ex	Ex
Janus Yellow G (MLB)	236	*a* 1 & 2	VG/G	VG	Ex/VG	Ex	Ex	Ex	VG	G
Janus Yellow R (MLB)	236	*a* 1 & 2	VG/G	Ex/VG	Ex	Ex	G/VG	Ex	G/VG	P
Polar Yellow 5G (Geigy)	642	1	*b* G/VG	VG/Ex	Ex	Ex	Ex	Ex	Ex	Ex
*Flavazine L (MLB)	636	2	—	G	VG	P	P	P	P	Ex
*Xylene Lt. Yellow R (Sandoz)	639	1	—	VG	Ex/VG	VG	Ex	VG/G	VG	Ex
Polar Orange G (Geigy)	—	1	G/F	G	G	Ex	Ex	Ex	Ex	Ex
Xylene Milling Orange R (Sandoz)	—	1	—	F/P	F	Ex	Ex	Ex	Ex/VG	Ex
*Orange G	27	2	—	G/VG	VG/Ex	P	P	P	P	—
Supramine Red 2G (Bayer)	—	2	G/VG	VG/G	VG/Ex	Ex	VG	Ex	VG	Ex
Fast Acid Red 3G (Leonhardt)	—	2	F	F/G	F/G	Ex	VG	Ex	VG	VG
Naphthamine Scarlet B (Kalle)	—	1	F	F/G	G	Ex	VG	VG	G	Ex
Fast Acid Red RH (BDC)	—	1	*c* F	F/G	G/VG	—	—	G	G	Ex
Polar Red G (Geigy)	430	1	G/VG	VG/G	VG/Ex	Ex	Ex	Ex	Ex	Ex
Polar Red R (Geigy)	430	1	F	G	VG	Ex	Ex	Ex	Ex	Ex
*Cloth Red G (BDC)	249	*a* 1 & 2	G/VG	Ex/VG	Ex	Ex	Ex	Ex	VG/G	Ex
*Amido Naphthol Red G (MLB)	31	2	F/G	VG/G	VG	VG	VG	G	G	Ex
Aliz. Cyanole Red B (Cassella)	—	2	G	VG	VG	Ex	Ex	Ex	Ex	Ex
Cloth Red B (Bayer)	259	*a* 1 & 2	G/VG	VG	Ex	Ex	Ex	Ex	VG	F
*Wool Red B (Cassella)	262	2	F/G	G/VG	Ex/VG	—	—	VG/G	G	Ex
Violamine A2R (MLB)	—	2	F	VG/G	Ex	VG	VG/G	VG	VG/G	VG
Violamine B (MLB)	757	2	F/G	VG/G	VG	VG	VG	VG	VG/G	Ex
Anthraquinone Violet (Badische)	1080	2	G	VG	VG/Ex	Ex	Ex	Ex	Ex	Ex
Wool Fast Violet B (Bayer)	833	2	P	G/F	G/VG	Ex	Ex	Ex	Ex	Ex
Aliz. Irisol R (Bayer)	1073	2	VG/G	VG/Ex	Ex	Ex	Ex	VG	G/VG	Ex
Violamine 3B (MLB)	760	2	F/G	VG	Ex/VG	Ex	Ex	Ex	Ex	Ex
Indocyanine B (AGFA)	—	1	G	VG	Ex	Ex	Ex	Ex	Ex	Ex
Xylene Fast Blue FF (Sandoz)	—	1	—	VG	—	Ex	Ex	—	—	Ex
Silk Blue BJSC (Greisheim)	—	2	P	F/P	F	Ex	Ex	Ex	VG	F
Cyananthrol BGA (Badische)	1077	2	G/F	VG/G	VG	G	G	F	P	Ex
*Coomassie Navy Blue 2RNX (BDC)	289	1	—	VG/G(4%)	VG(6%)	Ex	Ex	Ex	Ex	Ex
Aliz. Supra Sky R (IG)	—	2	G	VG	VG	Ex	Ex	Ex	VG	Ex
Aliz. Direct Green 5G (MLB)	—	2	VG	Ex	Ex	Ex	Ex	Ex	VG	Ex
*Aliz. Cyanine Green G (BDC)	1078	2	VG	Ex	Ex	Ex	Ex	Ex	VG	Ex
Cyanole Fast Green G (Cassella)	—	2	*d* P	F	F	VG	VG	G	G	Ex
Chlorazol Fast Brown RK (BDC)	—	1	G/VG	VG	VG/Ex	Ex	Ex	Ex	VG	Ex
Polar Red Brown V (Geigy)	—	1	G/VG	VG/Ex	Ex	Ex	VG	VG	G/VG	Ex
Benzo Fast Brown RL (Bayer)	—	1	*c* G/F	G	G/VG	Ex	Ex	Ex	VG	Ex
Toluylene Fast Brown 2R (Bayer)	—	1	G/VG	VG	Ex	Ex	Ex	Ex	Ex	Ex
Diamine Fast Brown GB (Cassella)	—	1	G/F	G/VG	VG/G	Ex	Ex	Ex	VG	Ex
*Supramine Brown R (Bayer)	—	2	G/F	G/VG	VG/Ex(6%)	Ex	Ex	Ex	Ex	VG
Radio Brown B (Cassella)	—	1	G/F	G/VG	VG	Ex	Ex	Ex	VG	Ex
Acid Alizarine Grey G (MLB)	—	2	G	G/VG	VG	Ex	Ex	Ex	Ex	Ex
*Neutral Grey G (AGFA)	267	1	*b* G/F	G	G/VG	Ex	Ex	Ex	Ex	Ex
*Coomassie Fast Black B (BDC)	307	1	—	G/F(6%)	VG/G(12%)	Ex	Ex	Ex	VG/G	Ex
Gloria Black N (Bayer)	—	1	—	—	VG(12%)	—	—	VG	G	Ex

NOTES—*a* dyeings done by each method were exposed but no differences in fastness were observable.
b faded greener.
c faded much yellower.
d faded much bluer.

TAKAMINE PRODUCTS TAKE MEDAL

AN exhibit of enzymatic products at the International Exposition at Paris last year won for the Takamine Laboratory, Inc., of Clifton, N. J., the Grand Prix with gold medal, according to an announcement made last week by the company.

The products displayed at the exposition included a number of specialties used in textile processing, such as Polyzime and Polyzime P for desizing, Solvase for use in dry cleaning, Laundr-Aid for power laundry use. Other products were those used in processing in the baking industry, pharmaceutical work and general starch conversion processes.

The Takamine Laboratory was founded by the late Dr. Jokichi Takamine, the eminent Japanese scientist and discoverer of adrenalin. The company's endeavor has been to adapt the use of enzymes to the many problems of industry where catalytic agents are required.

The interests of the Takamine Corporation are world-wide, centering chiefly in Tokio, Japan, and New York City. The scientific work of the founder of these interests is being carried on by his two sons, Jokichi Takamine, Jr., of Ridgewood, N. J., and Eben T. Takamine, of New York City, together with their associates.

J. B. Byrd, formerly overseer of raw stock dyeing at the Eagle & Phenix Mills, Columbus, Ga., has accepted a similar place with one of the mills in Hickory, N. C.

TO OUR CONTRIBUTORS

Those who may prepare technical articles or papers for publication will find the following information of value:

Always typewrite manuscripts double-space; leave liberal margins.

Enclose photographs, drawings or graphs whenever possible.

Drawings, graphs, etc., should always be in *black* (not colored) India ink (not pencil) on *white* paper or cardboard, clear and not too small (twice the reproduced size is good).

Photographs clipped from magazines never reproduce so well as the original positive print.

Very long tables of figures are best typewritten in strong black type for reproduction; any column rules thereon drawn in black ink.

Always order your reprints before publication or when manuscript is submitted, as reprints are expensive when ordered after type has been broken up.

BUYING LESS FROM EUROPE

While Europe Buys More Textiles

Purchases of textiles from European sources are not increasing, according to E. T. Pickard, head of the Textile Division of the Department of Commerce, while the opposite is true with regard to our exports to Europe. Mr. Pickard recently returned from an extended trip which took him through some of the South American countries that import American textile products in large quantities. He will review the high spots of his trade survey as soon as he has correlated some of the data collected on the trip.

M. K. Ryan, of the United States Testing Company, Inc., sailed on the President Cleveland for Shanghai, Friday, where he will become assistant manager of the Shanghai International Testing House, relieving R. J. Schwartz, who is due home after four years' continuous service at the Shanghai Testing House. Mr. Ryan will spend several weeks in Japan before proceeding to China. Upon his return to this country Mr. Schwartz will join the inspection staff of the recently organized Raw Silk Classification Department of the Hoboken Testing House. He will give special attention to the seriplane inspection of China steam filature raw silk for evenness, neatness, cleanness and other visual characteristics in which he specialized while in China.

The Antipyros Company, of 551 West Fifty-second Street, New York City, has purchased additional new equipment for dyeing and waterproofing of fabrics, having just completed its new ranges of machinery for fireproofing. The new additions should be completely installed by May 1.

The rate for "Position Wanted" advertisements in this column is 2 cents a word—with a minimum of 50 cents per insertion. For all other types of advertisements—i. e., help wanted, machinery or supplies for sale—the rate is $5.00 per column inch or less per insertion.

LABORATORY DYER

Expert laboratory man wanted. Must have had experience in all types of dyeing. Excellent possibilities. Address Classified Box 515, American Dyestuff Reporter.

CHEMICAL SALESMAN

Salesman, thirty-eight, married, fifteen years' experience selling chemicals, oils and colors to the textile and leather trades. Thoroughly familiar with Pennsylvania, Maryland, Virginia and West Virginia territory. Address Classified Box 516, American Dyestuff Reporter.